4.6 NOISE AND VIBRATION

This section presents an evaluation of the noise environment in the vicinity of the proposed Gregory Canyon Landfill, including a discussion of noise measurement scales, noise regulations, existing noise conditions in and near the project site, potential short-term noise increases due to construction of the proposed landfill and ancillary facilities, and potential long-term noise increases due to operation of the landfill. This section is a summary of the “Noise Assessment for the Proposed Gregory Canyon Landfill” prepared by Mestre Greve Associates, 1999 and an addendum prepared by PCR Services Corporation, 2002 (Appendix J). In addition, ambient noise measurements were conducted in November 2000 by PCR Services Corporation and are provided in Appendix J of this Final EIR.

In addition, this section contains a summary of a vibration technical report that was prepared by Ogden Environmental and Energy Services in 1996 which addresses existing vibratory site conditions, as well as potential impacts to the First San Diego Aqueduct from construction blasting activities at the proposed Gregory Canyon Landfill site. The Ogden report has been supplemented by additional vibration impact modeling conducted by Investigative Science and Engineering (ISE, December 1998), to determine the level of impact on nearby residences and the SDG&E transmission facilities. The vibration studies are also contained in Appendix J.

4.6.1 EXISTING SETTING

4.6.1.1 Community Noise Measurement Scales

Community noise levels are measured in terms of the “A-weighted decibel,” abbreviated “dBA.” A-weighting is a frequency correction that correlates overall sound pressure levels with the frequency response of the human ear.

The “equivalent noise level,” or “L_{eq}” is the average noise level on an energy basis for any specified time period. The L_{eq} for one hour is the energy average noise level during the hour, specifically, the average noise based on the energy content (acoustic energy) of the sound. It can be thought of as the level of a continuous noise that has the same energy content as the fluctuating noise level. The equivalent noise level has the units of dBA.

Several rating scales have been developed for measurement of community noise. These account for: (1) the parameters of noise that have been shown to contribute to the effects of noise on people; (2) the variety of noises found in the environment; (3) the variations in noise levels that occur as a person moves through the environment; and (4) the variations associated with the time of day.

The predominant rating scale in use in California for land use compatibility assessment is the Community Noise Equivalent Level (CNEL). The CNEL scale represents a time-weighted 24-hour average noise level based on the A-weighted decibel. “Time-weighted” refers to the fact that the noise levels during certain hours are adjusted for increased sensitivity of hearing during these hours, by adding five decibels (dB) to each of the evening hour readings (7 P.M. to 10 P.M.) and ten dB to each reading during the nighttime hours (10 P.M. to 7 A.M.). These time periods and penalties were selected to reflect people’s increased sensitivity to noise during these time periods. The “day-night” or “L_{dn}” scale is similar to the CNEL scale except that evening hour readings are not adjusted. A CNEL noise level may be reported as a “CNEL of 60 dBA,” “60 dBA CNEL,” or simply “60 CNEL.”

Intermittent or occasional noises such as those associated with certain types of earth moving operations are not of sufficient volume to exceed community noise standards that are based on a time averaged scale such as the CNEL scale. A common method of characterizing these noise levels is with the L_{eq} or equivalent noise level (see description above).

The measurement levels are in terms of L percent, which show the noise levels for different time durations to describe the existing ambient noise environment. The results are presented in terms of the equivalent noise levels (L_{eq}), maximum (L_{max}) and minimum (L_{min}) noise levels, and percentile noise levels (L). The L50 percentile level, for example, is the noise level exceeded 50 percent of the time. The L50 level represents the median or average noise level. The L90 level represents the most quiet noise level experienced, or the background noise level. The L_{max} level represents the loudest instantaneous noise level recorded during the measurement period, and the L_{min} represents the quietest level.

4.6.1.2 Noise Regulations

Applicable policies and regulations that serve to protect people and animals from adverse noise impacts are discussed in this section. The project activities are evaluated in terms of whether or not they would contribute to the exceedance of the applicable noise standards.

<u>San Diego County Noise Ordinance</u>

Fixed source and/or operational noise are governed by Section 36.404 of the San Diego County Code, (referred to as the “County Noise Ordinance” or “Ordinance”). The applicable sound level restrictions from the County Noise Ordinance are a function of the time of day and the land use zoning designation. Sound levels are measured at the property boundary of the noise source. The relevant limits from the Ordinance are shown in Table 4.6-1.

Although Proposition C sets a noise level of 65 CNEL at the site boundaries as acceptable, the potential noise impacts of the proposed landfill have been assessed based on the more restrictive County Noise Ordinance standards for daytime activities. (The proposed project operation hours are Monday through Friday between 7:00 A.M. and 6:00 P.M., and Saturday from 8:00 A.M. to 5:00 P.M.)

Table 4.6-1 provides the exterior noise standards in the San Diego County ordinance, which are based on the property zoning. Exhibit 4.1-4 provides the zoning designation for properties within the project vicinity. Table 4.6-1 indicates that the daytime standard for the adjacent residential land uses is 50 dBA L_{eq}. The proposed landfill is similar to the types of uses allowed in the Special Purpose Use Zones (S-82) and Manufacturing/Industrial Zones (M-58). Therefore, the project site would have a daytime standard of 75 dBA L_{eq} (Table 4.6-1). The County uses the arithmetic mean when different zones are adjacent to one another. The arithmetic mean between residential and industrial zones is 62.5. Therefore, the “62.5 dBA L_{eq}” is the noise limit that the proposed Gregory Canyon Landfill must not exceed at the project’s property line.

TABLE 4.6-1
SAN DIEGO COUNTY NOISE ORDINANCE EXTERIOR NOISE STANDARDS

		NOISE LEVEL NOT TO BE EXCEEDED	
ZONING	NOISE METRIC	7 A.M. TO 10 P.M. (DAYTIME)	10 P.M. TO 7 A.M. (NIGHTTIME)
R-S, R-D, R-R, R-MH, A-70, A-72, S-80, S-81, S-87, S-88, S-90, S-92, R-V, and R-U Use regulations with a density of less than 11 dwelling units or less per acre.	L_{eq} (1-hour)	50 dBA	45 dBA
R-RO, R-C, R-M, C-30, S-86, R-V, and R-U Use regulations with a density of 11 or more dwelling units per acre.	L_{eq} (1-hour)	55 dBA	50 dBA
S-90 and all other commercial zones	L_{eq} (1-hour)	60 dBA	55 dBA
M-50, M-52, M-54	Anytime	70 dBA	70 dBA
S-82, M-58, and all other industrial zones	Anytime	75 dBA	75 dBA

[a] Zoning Designations:
R-C, R-D, R-M, R-MH, R-R, R-RO, R-S, R-U, R-V = residential zones
A-70, A-72 = agriculture zones
M-50, M-52, M-54, M-58 = manufacturing/industrial zones
C-30 = commercial zone
S-80, S-81, S-82, S-86, S-87, S-88, S-90, S-92 = special purpose use zones

[b] The noise limit shall be raised to the measured ambient noise level, if the ambient noise level is higher. The ambient noise level shall be measured when the alleged noise violation source is not operating.

[c] The noise limit on the boundary between two zoning districts shall be the arithmetic mean of the respective noise limits, provided however, that the one-hour average sound level limit applicable to extractive industries (including but not limited to borrow pits and mines), shall be 75 dBA at the property line regardless of the zone where the extractive industry is actually located.

Source: San Diego County Code, Section 36.404

Section 36.410 of the San Diego Noise Ordinance addresses noise from short-term construction activity. The ordinance limits operation of construction equipment between the hours of 7:00 A.M. and 7:00 P.M. In addition, construction equipment noise levels must not exceed 75 dBA for eight hours during any 24-hour period when measured at or within the property line of any residence.

San Diego County General Plan, Noise Element

The County Noise Ordinance protects noise sensitive areas, such as residential areas from fixed and/or operational noise sources, but does not apply to mobile noise sources, such as automobiles or heavy trucks traveling on public roadways. Public roadway noise is “regulated” through the implementation of the Noise Abatement Control Policies adopted as part of the Noise Element of the San Diego County General Plan (San Diego County, 1980). These policies identify unacceptable noise levels for noise sensitive land uses and recommend measures for controlling noise levels. For new development that would result in any (existing or future) noise sensitive area to be exposed to noise levels equal to 60 dBA CNEL or greater (exterior), the applicant must prepare a noise study. For any noise sensitive areas determined to be exposed to noise greater than 60 dBA CNEL, mitigation measures are specified. These mitigation measures include modifications to the proposed project, or modifications to the affected property using the most current noise abatement technology.

Additionally, the County of San Diego established noise standards for new residential developments impacted by transportation noise sources (e.g., roadways). The noise standards are 60 CNEL for private outdoor living areas (e.g., rear yards), and 45 CNEL for indoor noise sensitive areas. While these standards do not apply directly to this project, they are used as a guideline for assessing off-site landfill-related traffic impacts.

Proposition C

Section 5K of Proposition C provides the following mitigation measure relevant to the proposed project:

The applicant shall prepare a Noise Abatement Plan to include:

1. *Physical design provisions to ensure that ambient noise levels do not exceed 65 CNEL at the boundaries of the Gregory Canyon site;*
2. *Installation of landfill equipment and vehicles with noise suppressing equipment to assist in meeting the above restrictions;*
3. *Provisions for at least 24-hour in advance written notice of any blasting on-site to residents within a one-mile radius of the blast site.*
4. *Where ambient noise levels exceed 65 CNEL at the boundaries of the Gregory Canyon site, the Applicant shall retain a qualified noise expert to evaluate the problem and recommend mitigation measures. These mitigation measures shall be implemented by the Applicant.*

The intent of Proposition C is that the Noise Abatement Plan would be prepared as part of the environmental analysis and would consist of project design features incorporated into the project as well as mitigation measures identified to minimize noise and vibration impacts from project implementation.

Wildlife Habitat Protection Regulations

Construction and operational noise generated by the proposed project could potentially have a significant adverse effect on least Bell's vireo nesting habitat. As discussed in Section 4.9, Biological Resources, the riparian vegetation located along the San Luis Rey River within the project site, is habitat for this bird species. Based on a study conducted by the San Diego Association of Governments (SANDAG) in 1991, it was theoretically estimated that noise levels in excess of 60 dBA L_{eq} in vireo habitat would mask the bird's song, subsequently reducing the reproductive success of this species during their breeding season which occurs between mid-March and mid-September, and its ability to defend its territory. Also, in 1991, the U.S. Fish and Wildlife Service (USFWS) recommended that noise levels not exceed 60 dBA to protect the Gnatcatcher and other bird species. Therefore, the 60 dBA L_{eq} will be used as the noise criteria to assess noise impacts on the wildlife both on and off site (adjacent to SR 76). While the noise levels are presented in this section, the analysis of impacts to wildlife and recommended mitigation are provided in Section 4.9, Biological Resources.

4.6.1.3 Existing Noise Levels

Ambient Noise Levels

Measurements of the existing ambient noise levels were performed at five locations along the southern and western Gregory Canyon site boundary (R1 through R5) and at two sensitive wildlife habitat locations (LBV-1 and LBV-2) along the San Luis Rey River. See Exhibit 4.6-1 for the ambient noise measurement locations. Measurements were performed between November 1 and 3, 2000, by PCR Services Corporation using the Larson-Davis Model 820 noise monitor. Table 4.6-2 provides a summary of the ambient noise measurement data at the five locations shown in Exhibit 4.6-1. Data sheets from the field measurements and the complete results of the 24-hour noise monitoring are provided in the Noise Study (Appendix J). One-hour noise measurements were performed at locations R3, R4, and R5, while a 15-minute measurement was taken at location R2 during daytime hours (7:00 A.M. to 6:00 P.M.). The existing noise conditions at locations R1, LBV-1, and LBV-2 were measured over a 24-hour period. The selected noise levels from the 24-hour measurements, with the exception of R1, represent the highest daytime hourly conditions recorded during the monitoring period. Higher results were recorded at R1 but were not used to quantify the existing conditions since the elevated noise levels were associated with setting up the equipment and/or equipment tampering. As indicated in Table 4.6-2, typical noise sources included birds, the rustling of trees, local residents, a distant tractor, and the occasional aircraft and/or automobile. The resulting noise levels (L_{eq}) ranged from a minimum of 38.5 (at location R3) to a maximum of 58.1 (at location R1) dBA.

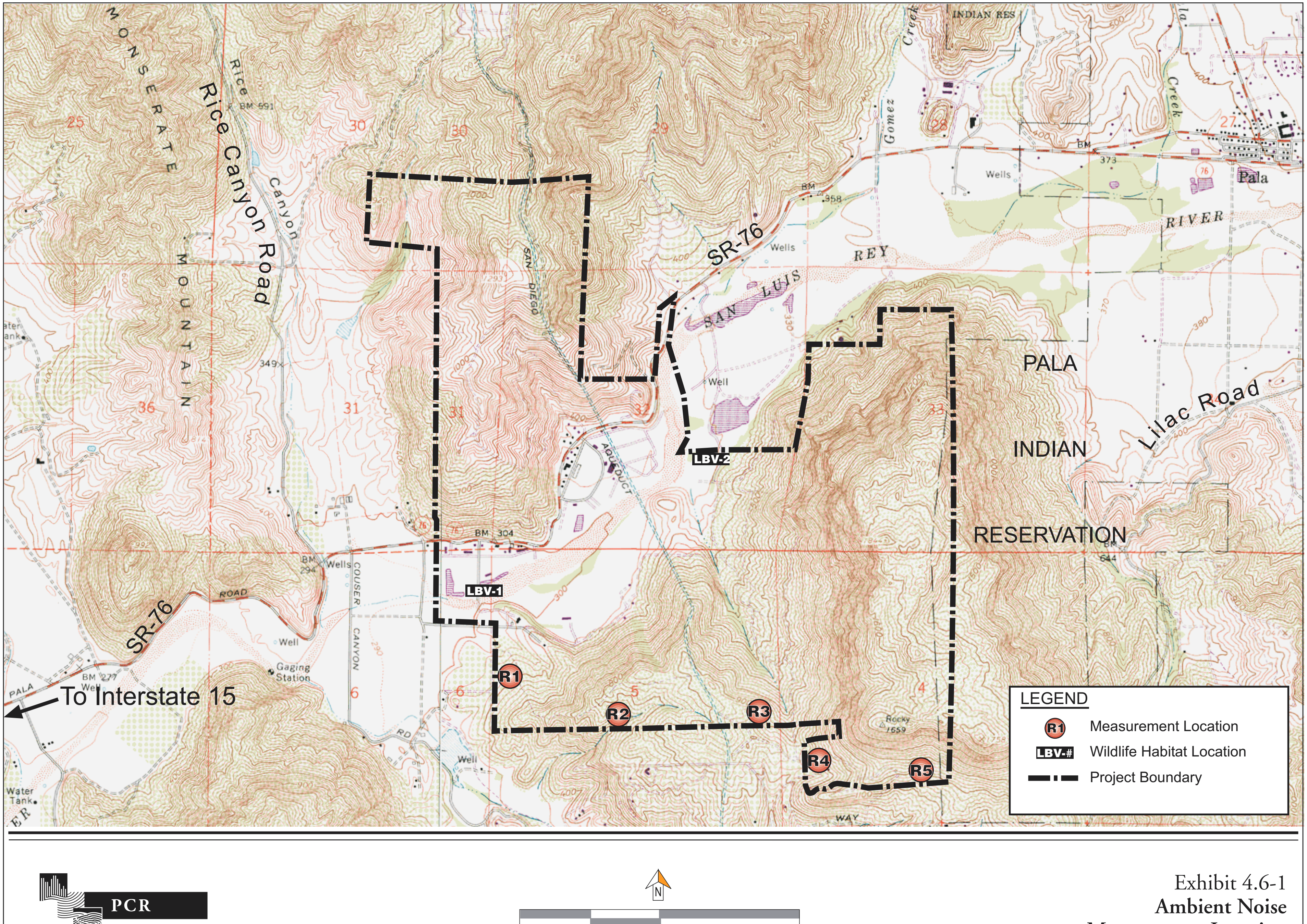
To further characterize ambient conditions the L_{eq}, L_{90}, and arithmetic average noise levels were calculated at the three 24-hour measurement sites for the proposed project's operational hours (7:00 A.M. to 6:00 P.M.) and are provided in Table 4.6-2. These daily noise levels are all less than the maximum daytime hourly L_{eq} and, therefore, the noise analysis conservatively used the maximum daytime hourly L_{eq} in calculating potential noise impacts.

Estimated Existing Roadway Noise Levels

Estimates of existing roadway noise levels in terms of CNEL were computed for the roadways that would serve the project site and are shown in Table 4.6-3. The values do not take into account the possible effects of existing noise barriers or topography. Table 4.6-3 shows the distances from the centerline of the road to the 60, 65, and 70 CNEL contours. The table indicates that the area along SR 76 east of Highway 395 has an estimated existing noise level without the project in excess of 70 CNEL; and the area along SR76 west of Highway 395 has an estimated noise levels without the project in excess of 65 CNEL which exceeds the County Noise Element's limits of 60 CNEL.

Exhibit 4.6-2 illustrates the approximate location of the existing 60 CNEL along SR 76 between the proposed project access road and I-15. A site visit was conducted in April 2000 to verify the location and numbers of residences.[1] As shown, there is a cluster of residences located within the 60 CNEL contour of SR 76 between I-15 and Rice Canyon Road on the north side of SR 76. This is an existing condition not caused by the proposed project. Based on estimated noise levels from existing traffic volumes, these homes are currently exposed to noise levels that exceed the County's Noise Element limit.

1 Site visit conducted by PCR staff, April 2000.



Sources: U.S.G.S., Pala 7.5-Minute Quad and PCR Services Corp., 2000

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Exhibit 4.6-1
Ambient Noise Measurement Location

TABLE 4.6-2
EXISTING AMBIENT NOISE MEASUREMENT LEVELS

MEASUREMENT			ONE-HOUR NOISE LEVELS (dBA) [a]						DAYTIME NOISE LEVELS (dBA) [h]				
LOCATION [b]	DESCRIPTION	DURATION	L_{eq}	L_{MAX}	L_{MIN}	L_{10}	L_{50}	L_{90}	MINIMUM HOURLY L_{eq}	AVERAGE L_{eq} [I]	ARITHMETIC AVERAGE NOISE LEVEL [J]	L_{90}	CNEL
LBV-1	Wildlife Habitat	24-hours	53.9	77.4	36.4	47.9	42.6	37.7	38.9	47.0	44.5	35.7	49.4
LBV-2	Wildlife Habitat	24-hours	47.7	65.6	35.6	47.8	42.3	38.9	38.1	42.9	43.3	35.0	48.6
1	Western Boundary	24-hours	58.1	89.3	43.7	54.3	50.3	47.5	49.3	54.6	52.1	46.2	54.4
2	Southern Boundary [c]	15-minutes	38.9	55.9	29.9	– [g]	– [g]	– [g]	– [g]	– [g]	– [g]	– [g]	– [g]
3	Southern Boundary [d]	1-hour	38.5	55.5	26.7	– [g]	– [g]	– [g]	– [g]	– [g]	– [g]	– [g]	– [g]
4	Southern Boundary [e]	1-hour	41.2	58.2	22.0	– [g]	– [g]	– [g]	– [g]	– [g]	– [g]	– [g]	– [g]
5	Southern Boundary [f]	1-hour	43.7	62.6	25.2	– [g]	– [g]	– [g]	– [g]	– [g]	– [g]	– [g]	– [g]

[a] Noise levels provided represent the highest noise measurements recorded during the monitoring period. Daytime ambient noise levels at R1 are likely overestimated due to intermittent agricultural activity occurring immediately adjacent to the noise monitor during the maximum-recorded noise level. Based on the remaining daytime hourly noise measurements ambient conditions at R1 would be approximately 51 dBA.
[b] Monitoring locations are shown on Exhibit 4.6-1
[c] Birds and residents; 70 degrees; 35% relative humidity; no wind.
[d] Distant Tractor, aircraft, and birds; 68 degrees; 45% relative humidity; wind 0-5 mph from the north.
[e] Aircraft, helicopter, and birds; 75 degrees; 35% relative humidity; no wind.
[f] Aircraft, trees rustling, helicopters, and one car; 77 degrees; 35% relative humidity; wind 0-5 mph from the south.g Data not measured
[h] Represent proposed project's operational hours (7:00 a.m. – 6:00 p.m.).
[I] The standard deviation for the average L_{eq} is 3.8, 3.1, and 1.6 dBA for location LBV-1, LBV-2, and R1, respectively.
[j] The standard deviation for the arithmetic average noise level is 4.6, 3.5, and 3.3 dBA for location LBV-1, LBV-2, and R1, respectively.
Monitoring was conducted by PCR Services Corporation, November 1 through November 3, 2000.
Source: PCR Services Corporation, 2002

TABLE 4.6-3
ESTIMATED EXISTING TRAFFIC NOISE LEVELS

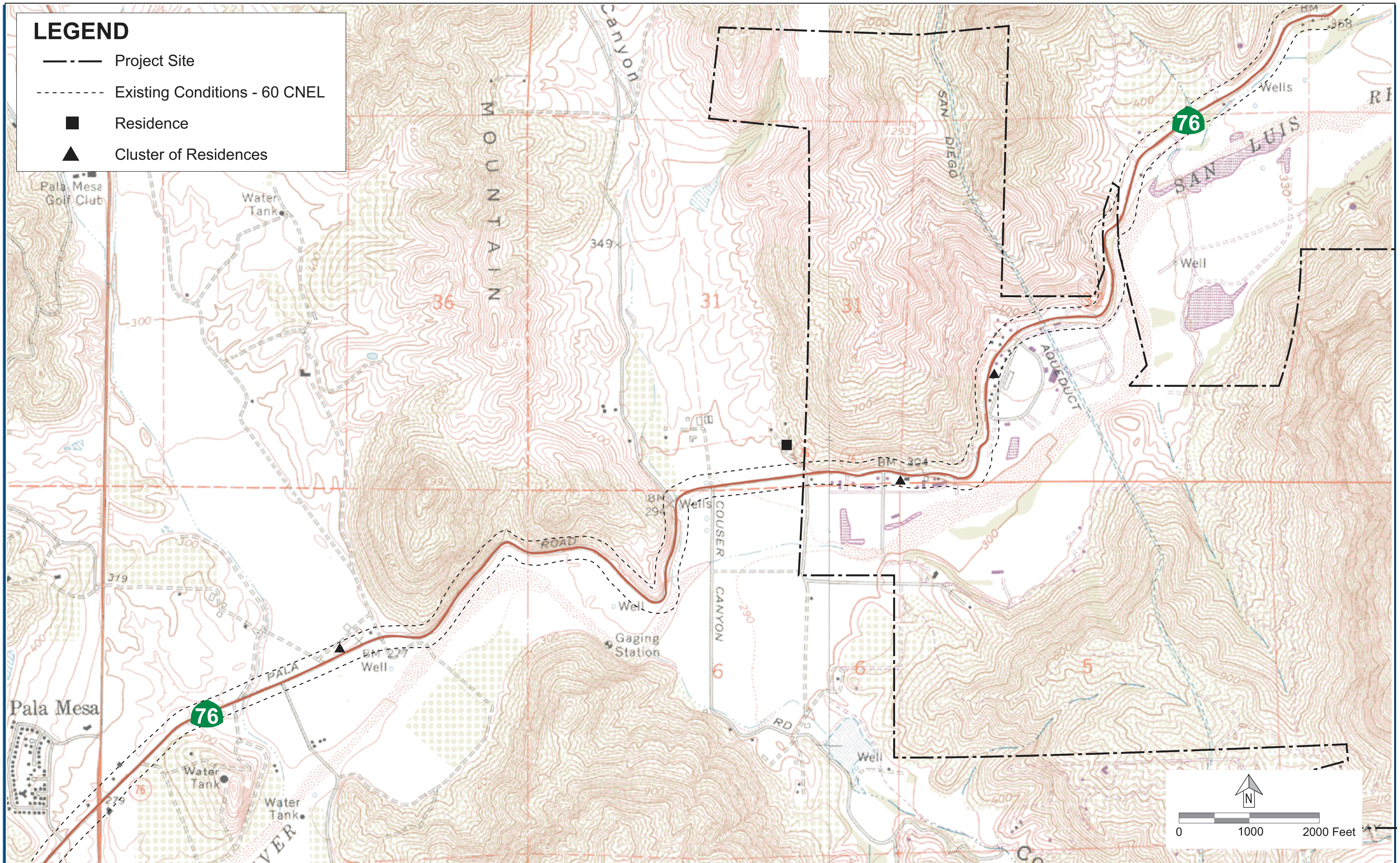
HIGHWAY/ROAD SEGMENT	ESTIMATED EXISTING NOISE LEVELS @ 100 FT FROM CENTERLINE	ESTIMATED DISTANCE TO CNEL CONTOUR FROM CENTERLINE OF ROADWAY (FEET)		
	(CNEL dBA)	70 CNEL	65 CNEL	60 CNEL
SR 76				
West of Highway 395	68.2	77	159	306
East of Highway 395	70.2	104	209	398
West of I-15	70.2	104	209	398
I-15 to Pankey Rd.	64.3	45	90	183
Pankey Road to Rice Canyon Rd.	64.3	45	90	183
Rice Canyon Rd. to Couser Canyon Rd.	64.1	42	89	180
Couser Canyon Rd. to access road	64.1	41	88	179
East of access road	64.1	41	87	179
West of Pala Temecula Rd.	63.9	RW	85	183
East of Pala Temecula Rd.	63.9	RW	85	182
Interstate 15				
North of SR 76	75.7	241	520	1,120
SR 76 to Pankey Rd.	76.2	258	557	1,199
Old Highway 395				
North of SR 76	67.7	71	152	328
South of SR 76	64.1	RW	87	187

RW = Noise contour falls inside the roadway right-of-way.
The existing noise contours do not take into account the effect of any existing noise barriers or topography that may affect ambient noise levels.
Source: Mestre Greve, 1999 and PCR Services Corporation, 2002

4.6.1.4 Vibration Technical Background

The study of wave phenomenon produced by a blasting event is identical to the study of wave motion produced by earthquakes, or seismology. The study of seismology predicts the vibratory response of the earth at various points due to some type of input excitation, in this case blasting.

Vibration is generally defined as any oscillatory (wave) motion induced in a structure or mechanical device as a direct result of an input excitation. The three major components of a vibratory system are: (1) the mass of the object; (2) the damping present in the object; and (3) the stiffness of the object. Input excitation, in this case the force and displacement generated by blast excavation, is the mechanism that starts a vibratory response. An object's inherent level of "damping" is the only natural mechanism that can temper the potentially destructive effects of the vibration. Damping is a type of 'drag' that is always present to some degree in an object and serves to remove energy from the vibrating system as it moves. Artificial damping, such as shock absorbers, viscous isolation materials, and simple friction, is used routinely in mechanical devices. The stiffness of a vibrating system allows an object to store the energy received and redistribute the energy in the form of a vibration. Without some form of stiffness, an object will not vibrate. Mechanical forms of stiffness include springs.



NOTE: 1) Noise contours are based on an attenuation rate of 4.5 dB per doubling of distance. Additional noise attenuation from buildings, foliage, and local topography are not included.

2) The existing residences on the project site would be removed as part of project implementation.

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Exhibit 4.6-2
Existing 60 CNEL

Source: USGS Quadrangle & PCR Services Corporation, June 2002

Blasting vibration is caused by the imperfect use of explosive energy released during blasting operations. In blasting vibration, the unused energy radiates through the surrounding rock mass in the form of stress-strain waves. When these waves come into contact with a surface, physical motion results as the energy induces oscillation in the ground surface. In the case where the oscillation frequency is of sufficient magnitude (such as in an earthquake), severe structural damage can occur.

Exhibit 4.6-3 provides typical vibration sources and their effects on buildings, equipment, and humans. The peak ground velocity produced by various disturbances is given throughout a wide spectrum ranging from the infinitesimal to the severe.

The San Diego County Ordinance Section 6314, provides maximum permissible vibration displacement levels for various zoning designations. Specifically, Section 6314 limits vibration caused by steady state, earth-borne oscillation which is continuous and occurring more frequently than 100 times per minute, or an impact-borne oscillation with discreet pulses at or less than 100 times per minute, to specific vibration displacement standards. These standards are applicable to commercial and industrial sources (such as fixed operating machinery) and do not apply to construction blasting since the proposed blasting operations are not continuous or impact oscillation generating activities. Further, the ordinance specifically exempts vibration caused by temporary construction or demolition.

San Diego County has no other vibration regulations that are applicable to the proposed landfill blasting operations. Typically, a specific structural design is based upon prudent engineering judgment, analytical verification, and compliance with a uniform building code, as required by the federal criteria discussed below.

U.S. Bureau of Mines RI 8507 Blasting Criteria

The U.S. Bureau of Mines, in its report RI 8507, "Structure Response and Damage Produced by Ground Vibrations from Surface Blasting," identified acceptable maximum transverse ground velocity levels. This criterion sets the maximum peak particle velocity as a function of frequency. Table 1 of the vibration technical report (Appendix J) indicates that the maximum allowable peak particle velocity for the range of frequencies between 11.0 and 40.0 Hz is limited to the value of 0.05 times the dominant blast frequency. For example, if the blast frequency was 30.0 Hz, the maximum allowable particle velocity at the monitoring point would be 1.5 inches per second. According to the U.S. Bureau of Mines, a range of frequencies between 11.0 and 40.0 Hz would produce negligible effects (i.e., displacement, fatigue, and damage) in conventionally constructed structures (i.e., structures built within the past 100 years).

Finally, the San Diego County Water Authority, which has authority over the operation and maintenance of the First Aqueduct system, adopted the blasting criteria provided in the RI 8507 report, or 2.0 inches per second total transverse displacement when blasting frequency of 40 Hz is used.

4.6.1.5 Existing Vibratory Conditions

Vibrations are commonly measured using a device known as an accelerometer. This device consists of a small crystal shaped instrument that is designed to produce a small electrical charge when it is vibrated. This electrical charge is transmitted via a cable assembly into a spectrum analyzer that displays the frequency content and magnitude of the electrical signal.

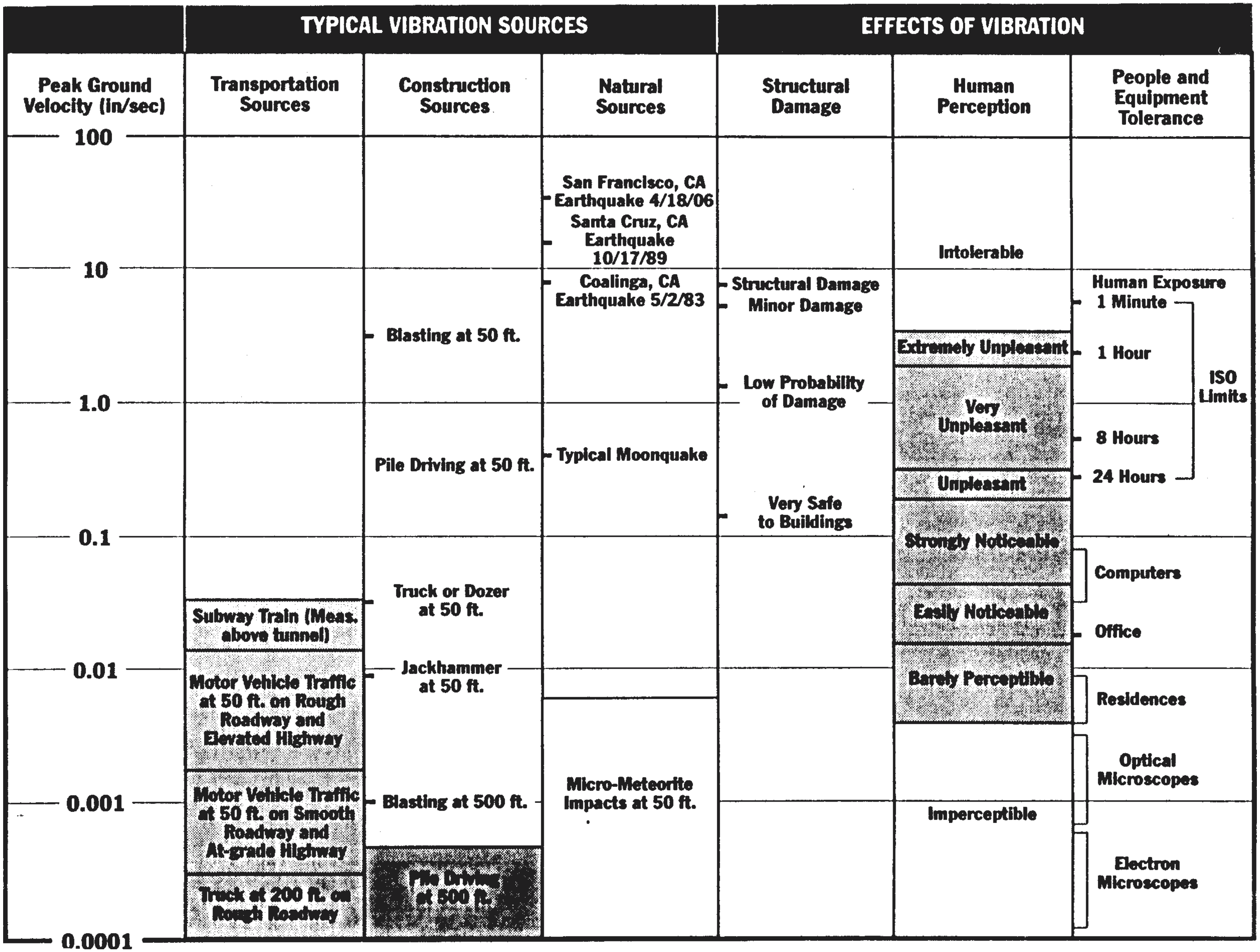

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Exhibit 4.6-3
Typical Vibration
Sources and Sensitivities

Sources: Ogden, 1996; David Evans and Associates, Inc., 1999

The determination of the existing vibratory environment of the Gregory Canyon project area consisted of two phases. The study methodology, equipment, and technical results of those tests are detailed in the vibration technical report (Ogden, 1996) and summarized below.

Ambient Vibration Conditions

A vibration test was conducted to determine ambient ground acceleration, velocity, and displacement at ten monitoring locations (tunnel portals) along the First Aqueduct alignment. Ambient vibration monitoring locations are shown on Figure 3 of the vibration technical report and the measured levels at each monitoring location are shown in Table 2 of that report. As indicated in Table 2, ambient ground velocity levels at the project site were found to average around 0.24 inches per second in the 25 Hz center frequency range and 0.14 inches per second in the 40 Hz center frequency range at most monitoring locations. Maximum vibration velocities of 3.35 inches per second at 25 Hz and 3.72 at 40 Hz were found to occur along SR 76, which was the most active location measured. Also, the project area is subject to seismicity owing to the proximity to the Elsinore Fault Zone, which passes approximately six miles northeast of the project site. Please see Section 4.2, Geology and Soils, for a discussion on earthquakes and seismicity.

Test Blasts

Five locations were tested along the First Aqueduct alignment to determine existing frequency responses and soil damping characteristics (see Figure 3 of vibration technical report). Specifically, input excitation (approximately 400 to 800 pounds of force) was applied to determine frequency response and coherence functions.

Graphs in Appendix B of the technical report indicate how the ground behaved dynamically when subjected to a sharp impact force. The response characteristics at the monitoring locations indicate that the lower frequencies (below approximately 25 Hz) correspond to motion of the aqueduct-soil system and should be avoided during blasting. Higher modal activity (above 40 Hz) could be associated with local “ringing” of the portal structure and are not an impact concern.

The average damping levels reflect the combined aqueduct-soil interaction levels and the results of the test show that a damping ratio of roughly 4.24 percent was present at the five test locations. This level is consistent with the surface composition (to the depth of the aqueduct) of this area, which is unconsolidated Cieneba loam and readily dampens vibratory energy. The Cieneba and Las Posas loam soil associations encompass a swath from 1,700 to 2,000 feet wide and extend northerly along the aqueduct approximately 4,500 feet from the southern property boundary.

Geological effects can both enhance and deduct energy from the seismic wave pulse and change the nature of the vibration. The geology of the site is discussed in depth in Section 4.2 (Geology and Soils). The First Aqueduct alignment passes through the colluvium above the rock layers and does not have direct interface with the rock layers.

To determine the vibratory effects of blasting at the project site, two additional test blasts were conducted at the Gregory Canyon site on February 23, 1996. Two test blasts, each consisting of approximately 30 pounds of Ammonium Nitrate/Fuel Oil (ANFO), were detonated in test holes located along a dirt access road adjacent to the proposed landfill site. Groundborne blast vibration data and seismic velocity levels at the aqueduct were obtained through the use of an accelerometer and a strong-motion seismograph, respectively. The results of the test blast are shown in Appendix C of the vibration technical report (Appendix J).

Large ground vibration levels are possible due to confined blasting operations. For blast number two, which occurred 100 feet from the instrumentation point, ground velocity levels reached slightly over 14 inches per second (peak motion). A prediction of approximately 1.53 inches per second would be expected if this were an open-face blast. Magnification levels of over nine times those predicted for an equivalent open-faced blast were recorded because, without a free face (i.e., ground opening) to provide relief, all explosive energy from the test blasts went into either plastic deformation of the soil around the charge or into groundborne vibration. Surface vibration levels recorded by the seismograph located at the nearest aqueduct portal indicated ground vibration levels of 0.13 and 0.11 inches per second at approximately 18 Hertz for the two shots respectively. These levels are below those set by the U.S. Bureau of Mines RI 8507 threshold standards.

4.6.2 SIGNIFICANCE CRITERIA

This section provides significance criteria for noise and vibration. Noise criteria are provided for impacts to sensitive land uses as well as wildlife.

4.6.2.1 Noise Criteria

A significant adverse noise impact on a sensitive land use (e.g., residential area) would result if the following conditions occur:

- The project-related noise would cause the applicable noise standard to be exceeded. In this case, the applicable standard for regulating fixed or operational landfill noise sources other than traffic noise on public roadways is the County Noise Ordinance limit of 62.5 dBA L_{eq} for residential uses that border the project site.[2]
- The applicable standard for project-related traffic noise on public roadways is the County Noise Element's limits of 60 CNEL for exterior living areas and 45 CNEL for interior living areas.

As noted in Section 4.6.1.2, the SANDAG and USFWS indicated that noise levels should not exceed 60 dBA L_{eq} to limit interference with the breeding season for least Bell's vireo. The significance of potential noise impacts on this species is discussed in Section 4.9, Biological Resources.

4.6.2.2 Blast Vibration Criteria

A significant adverse vibration impact would occur if blasting operations result in the exceedance of the U.S. Bureau of Mines RI 8507 standards, which are adopted in the San Diego County Water Authority design procedure manual 02229-3 (February 1995). Those frequency dependent standards are shown in Table 4.6-4.

[2] As previously described in this section, the County uses the arithmic mean to identify noise standards when different zones are adjacent to one another.

TABLE 4.6-4
U.S. BUREAU OF MINES RI 8507 STANDARDS

BLAST FREQUENCY COMPONENT (f) (Hz)	MAXIMUM ALLOWABLE PEAK PARTICLE VELOCITY (INCHES PER SECOND)
2.5 to 10.0	0.05
11.0 to 40.0	0.05 x (f)
>40.0	2.0

The maximum allowable peak particle velocity for the range of frequencies between 11.0 and 40.0 Hz is limited to the value of 0.05 times the dominant blast frequency. Thus for example, if the blast frequency was 30.0 Hz, the maximum allowable particle velocity at the monitoring point would be 1.5 inches per second.
Source: U.S. Bureau of Mines

4.6.3 POTENTIAL IMPACTS

4.6.3.1 Short-Term and Long-Term Construction Noise Impacts

As discussed in Chapter 3, Project Description, construction of the proposed landfill project would be an ongoing process; it would consist of both "short-term" and "long-term" components. Initial construction includes: construction of the access road and bridge; construction of modifications to SR 76 at the access road entrance; construction of the ancillary facilities; the initial blasting and excavation for the first phase of the landfill footprint; and the first stage of the waste containment system. Initial construction of the landfill is expected to take about nine to twelve months, with the first phase of blasting for the landfill footprint taking place over approximately six months (controlled blasts occurring roughly every three weeks during that time).

On-going or long-term construction would include the subsequent periods of constructing the landfill footprint. Each of these subsequent periods is estimated to take six to eight months, depending on the rate of refuse inflow. Furthermore, the time period between each phase of construction could be from one to five years. During each phase, blasting could occur over the majority of the landfill footprint; and like the initial phase, it is estimated to take approximately six months, with controlled blasts occurring roughly every three weeks during those periods.

Construction Assumptions

Excavation activities would have the greatest potential for generating off-site noise impacts in areas adjacent to the project site. The equipment used to excavate the site and crush rock, as well as the trucks used to import liner material or haul the rock off-site for sale,[3] could produce adverse noise levels. Peak noise levels from these combined operations would range from 70 to 95 dBA at a distance of 50 feet (Harris 1979). This type of noise usually drops off at a rate of six dB for each doubling of the distance from the source. Therefore, at 100 feet, the peak construction equipment noise level would range between 64 and 89 dBA; at 200 feet, the peak construction noise level would range between 58 and 83 dBA; and at 400 feet, the peak construction noise level would range between 52 and 77 dBA. For most types of construction

[3] A Major Use Permit is required for the exportation or sale of aggregate material and will be obtained if necessary. However, the noise analysis assumes the exportation of rock since this represents a worst-case scenario.

equipment, the L_{eq} noise levels would range between 5 and 15 dBA below the peak noise levels noted above.

According to Herzog, there could be up to 13 pieces of heavy equipment in operation during any one construction period: three loaders, two graders/scrapers, three excavators, three dozers, and two compactors (Herzog 1998). Based on these "worst-case" numbers and the specified types of equipment, and the estimated peak noise levels generated by these equipment, the L_{eq} noise level produced by construction activities on the project site is estimated to be approximately 78.5 dBA at a distance of 200 feet.

Short-Term Construction Noise Impacts

Noise Impacts at Residential Property Lines

Due to the distance of the "short-term" construction activities for the first phase of the footprint, entrance facilities area, access road, and bridge to the closest residential property line (located about 3,200 feet from the construction equipment), these activities would not create noise that would exceed applicable noise standards (i.e., the noise levels during short-term construction activities would be less than 62.5 dBA at the property line adjacent to residential uses). The use of Borrow/Stockpile Area A (located approximately 100 feet from a residential property line) during initial construction would involve heavy earth moving equipment that could generate noise levels of 74.0 dBA at a distance of 100 feet. However, the project includes a 15- to 20-foot high berm (relative to the stockpile elevation) along the western edge of the Borrow/Stockpile Area A. The location and elevation of the berm would change as the borrow/stockpile area is created; however, the height relative to the top of the borrow/stockpile area would remain constant. Noise levels produced at Borrow/Stockpile Area A during the initial construction would be reduced to below 62.5 dBA along the western property line adjacent to Location 1. Therefore, initial construction generated noise levels would be less than significant at this location. In addition, the project-related short-term construction noise levels from construction equipment would be well below the 75 dB maximum noise level for eight hours during any 24-hour period at or within the property line of residential uses specified for construction equipment by Section 36.410 of the San Diego Noise Ordinance. Noise associated with the first phase of the landfill footprint construction is discussed in the "Long-Term Construction Noise Impacts" section below.

Noise Levels Affecting Wildlife Habitat

As indicated previously, this section provides the technical information with regard to noise levels. Please see Section 4.9, Biological Resources, for a discussion regarding impacts and mitigation measures.

Construction of the access road and bridge would involve approximately 638 feet of bridge length, and excavation of the southern side of the river channel in the vicinity of the proposed bridge. The nearest least Bell's vireo habitat would be 50 feet or closer to the bridge construction site.

The L_{eq} noise levels generated by construction equipment such as dozers and graders would be approximately 76 dBA at a distance of 200 feet. At a distance of 50 feet from the sources, the L_{eq} is estimated to be approximately 88 dBA and peak construction noise levels would be expected to range from 66 to 92 dBA. This level would exceed the 60 dBA L_{eq} criterion specified by the USFWS.

In addition, the drilling operation for the bridge is a potential noise impact to the nearest wildlife habitat. It is assumed that drilling operation would take place after the clearing and excavation of the channel. The nearest distance from the drilling operation to the existing least Bell's vireo habitat located on the river could be 50 feet. At 50 feet, L_{max} noise could be approximately 92 dBA. As a result, the drilling operation, by itself, would be a significant noise source at the nearest wildlife habitat.

Initial construction of the landfill may involve heavy construction equipment such as dozers, graders, and scrapers, crossing the river using the existing low flow crossing at the western edge of the property. The heavy construction equipment would cross once and remain in the landfill footprint area and would not be expected to further use the low flow crossing. Construction of the landfill clay liner would include approximately 150 round trips (300 one way) comprised of clay and other deliveries, as well as worker vehicles. The hourly L_{eq} generated by these vehicle movements would be approximately 67.3 and 60.0 dBA at distances of 20 and 62 feet from the center of the roadway, respectively.[4] This estimate is based on a 10 hour work day with an even vehicle distribution throughout the day, vehicle speed of 15 mph, and a 2 dB truck correction for road grade. These levels would exceed the 60 dBA L_{eq} criteria for wildlife habitats.

Once the permanent bridge is complete, the low flow crossing will be removed and construction trips will use the permanent bridge to access the footprint area. The nearest least Bell's vireo habitat could experience a Lmax noise level of 71 dBA due to a single truck pass-by event. However, the L_{eq} noise level due to construction-related haul truck traffic (assuming 100 haul truck trips per day) is estimated to be approximately 49 dBA, which is below the 60 dBA L_{eq} criterion specified by the USFWS.[5] When combined with the existing ambient noise level of 53.9 dBA, the noise from construction-related haul truck traffic would be 55.1 dBA at the habitat, which is also below the USFWS criteria of 60 dBA L_{eq}.

Although it is anticipated that the bridge will be completed and ready for clay liner deliveries, for purposes of evaluating the worst-case noise scenario it was assumed that the bridge would not be finished in time and the low flow crossing would be used. As discussed above, noise levels in excess of 60 dBA would occur within 62 feet of the low-flow crossing. Projecting those unmitigated noise levels out to 1,000 feet or more, low-flow crossing noise would be approximately 42 dBA or less than the measured ambient noise levels on site. Unmitigated construction equipment noise levels at the bridge construction site would be approximately 53 dBA in the habitat near the existing crossing at a distance of 1,200 feet. Therefore, the combined noise of unmitigated low-flow crossing noise and peak construction noise would be 61 dBA in the habitat near the existing crossing and would extend the impact zone from 62 feet to 75 feet from the centerline of the low-flow crossing. Please see Section 4.9 for mitigation measures.

Rock crushing and processing would be located at least 1,500 feet from wildlife habitat locations LBV1 and LBV2. The noise produced by rock crushing would not exceed 54.2 dBA at a

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4 Estimated noise levels were calculated using the Federal Highway Administration (FHWA) traffic noise prediction model and a linear source noise drop-off rate of 4.5 dBA per doubling of distance. This drop-off rate is a reasonable assertion for a soft site (i.e., loose soil, lawn, field grass) where the noise-ground interaction path is generally found to be at elevations of eight feet or less above the ground.

5 Estimated noise levels were calculated using the FHWA traffic noise prediction model and a linear source noise drop-off rate of 4.5 dBA per doubling of distance for a soft site (i.e., loose soil, lawn, field grass). This estimate is based on a 10-hour workday with an even vehicle distribution throughout the day, and a vehicle speed of 15 mph.

distance of 1,500 feet. Rock crushing operations by itself would be below the USFWS 60 dBA criteria at locations 1 and 2. The rock crushing noise would not be expected to increase noise in proximity to the drilling operations during initial construction. Rock crushing noise could increase the noise at the permanent bridge from 49 dBA to 53 dBA. However, noise levels would remain below the USFWS 60 dBA criteria.

The measured ambient noise levels of 47.7 and 53.9 dBA at wildlife locations LBV1 and LBV2, respectively, were at least 10 dB below the predicted noise levels produced by initial construction. Therefore, these predicted noise levels from initial construction would not increase the noise levels when added to the existing ambient noise conditions, but would continue to exceed the 60 dBA L_{eq} criteria. The relevance of the potential noise effect from initial construction on the bird species is discussed in Section 4.9, Biological Resources.

Long-Term Construction Noise Impacts

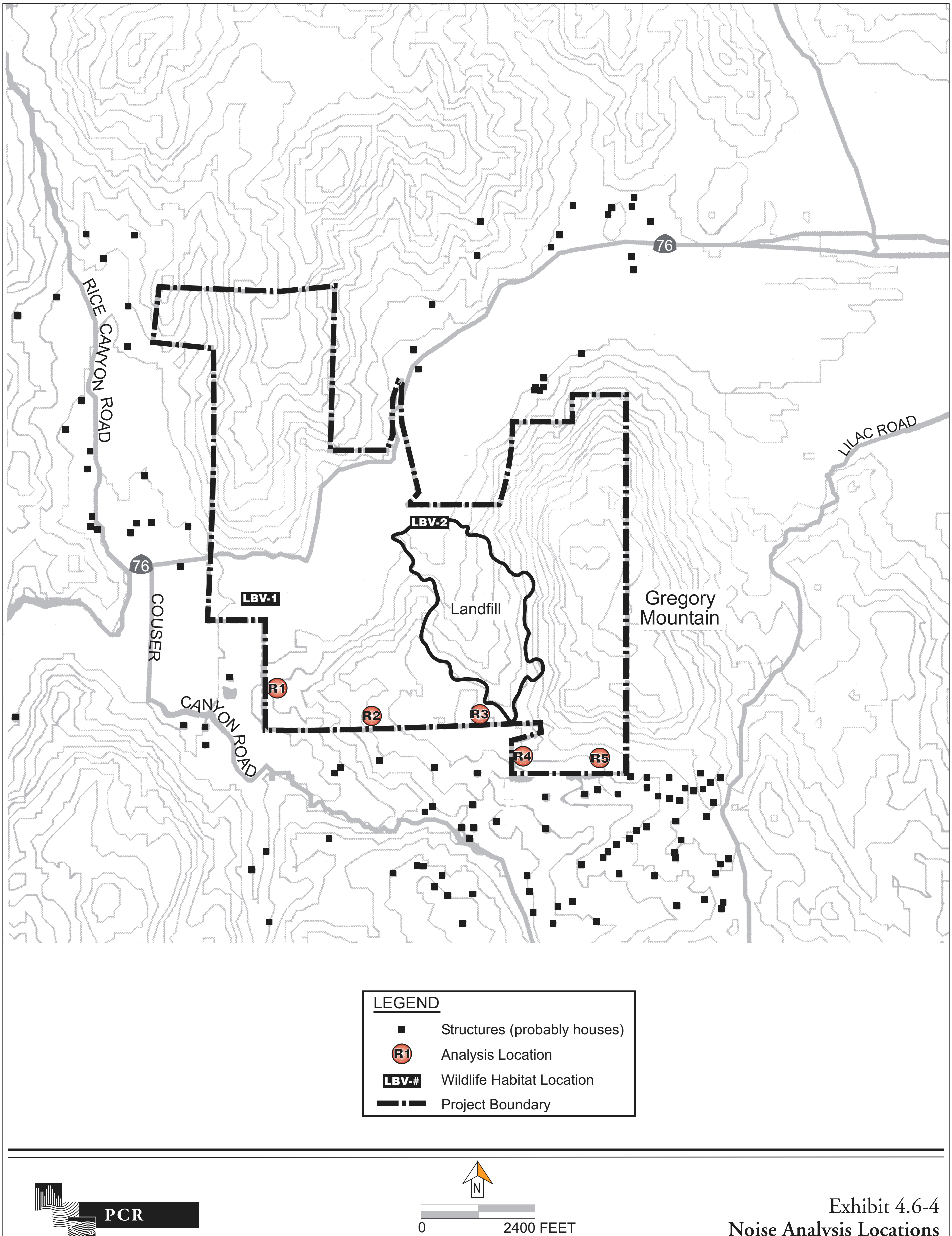
This section addresses the construction impacts associated with the periodic construction involving the excavation and blasting for the landfill working face, including the initial phase that would occur prior to opening of the landfill.

Noise Impacts at Residential Property Lines

The nearest residences are scattered to the south and west of the site. Currently, there are approximately twenty residences to the south and ten residences to the west located within about 3,000 feet of the portion of the site where the landfill activities would occur (Exhibit 4.6-4). Four locations along the southern property line and one location along the western property line of the site were identified as Analysis Locations 1 through 5 (Exhibit 4.6-4). These locations, which are representative of the nearest residential property lines, range between approximately 520 and 3,930 feet from the landfill footprint and 100 to 4,100 feet from the Borrow/Stockpile areas. The closest home would be 600 feet from any area where construction equipment would be working along the southern boundary.

Assuming "worst case" conditions (the maximum amount of construction equipment being used at the southernmost edge of the landfill), construction activities could generate peak noise levels ranging from 32 to 81 dBA at the nearest property boundary line, and an one-hour L_{eq} noise level of approximately 57 to 76 dBA, with the one-hour L_{eq} at the closest residential property line (360 feet from the landfill face) being 76 dBA. The potential construction equipment noise including rock crushing and processing may be discernible at the nearest home. Since this noise level could exceed the County Noise Ordinance standard of 62.5 dBA L_{eq}, the applicant shall monitor the noise levels at the adjacent residential property lines during the first year of initial construction and whenever the construction operations change. Measures, such as temporary noise barriers or operational limitations, such as the reduction in the size and number of construction equipment, will be used if necessary to reduce the noise level to 62.5 dBA. The measured ambient noise levels in proximity to the nearest residential property line are below the predicted noise levels produced by long-term construction (57 to 76 dBA). Therefore, with the mitigation measures referred to above, these predicted noise levels from initial construction would not increase the noise levels when added to the ambient noise conditions.

The construction of the new access road and bridge across the river would include drilling. The drilling activities, associated with the construction of the access road and bridge, would be intermittent, and therefore, the Lmax noise scale is the most appropriate to use to assess noise impacts. The nearest residential property lines are estimated to be located from 3,200 to 8,000



Sources: David Evans and Associates, 1999; PCR Services Corporation, 2000

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Exhibit 4.6-4
Noise Analysis Locations

feet from the potential drilling operation. The distances were measured from the location of the construction of the bridge to the nearest residential property lines. At these distances, the peak construction noise due to drilling operations could range between 50 to 58 dBA Lmax. When combined with the existing ambient noise level of 52.4 dBA measured at the nearest residential property line, the noise from long term bridge construction would be 59 dBA at the property line, which is also below the 62.5 dBA criteria. As a result, the construction activities associated with the new access road and bridge would not significantly impact the nearest residential areas due to their distances from these activities. In addition, the noise level associated with the use of construction equipment during drilling for the new access road and bridge would be well below the maximum noise level of 75 dB at a property line adjacent to residential uses set forth by the San Diego County Noise Ordinance.

Blasting would be required during each of the landfill construction phases to fracture the underlying rock structure and ease the removal of and access to final footprint elevations. Blasting noise consists largely of low frequency noise components. The human ear is less sensitive to low frequency noises than it is to high frequency noises, and the A-weighted noise scale which has a frequency correction that correlates overall sound pressure levels with the frequency response of the human ear weights the noise levels accordingly. The anticipated maximum noise level associated with project-related blasting activities at 1,300 feet is 59 dBA ($L_{\mathbf{max}}$). The nearest property lines are estimated to be located from 1,300 to 3,930 feet from the potential blasting operation. Based on the distances, the Lmax noise levels due to blasting would range from 38 to 59 dBA at these locations. The blasting noise combined with the highest measured ambient noise level of 52.4 dBA would be 59.9 dBA. Therefore, blasting noise would not exceed the 62.5 dBA L_{eq} standard at the property line. It should be noted that, while the blasting noise would not exceed the County Noise Ordinance standard, it would be a relatively infrequent impulsive noise that may cause annoyance for those residents that may hear it.

Proposition C requires a noise abatement plan that includes provisions to provide advance written notice to residents within a one-mile radius of the blast site at least 24 hours in advance of any blasting on-site.

Noise Levels Affecting Wildlife Habitat

During each phase of the landfill construction activities, the nearest distance from any construction equipment to the least Bell's vireo habitat along the river would be approximately 450 feet. At 450 feet, the peak construction noise would range from 51 to 76 dBA, and the L_{eq} noise level is estimated to be approximately 71 dBA. When combined with the existing ambient noise level of 47.7 dBA, and 54.2 dBA from rock crushing, the noise produced by long term construction would also be 71 dBA at the habitat. This level would exceed the 60 dBA L_{eq} criterion specified by the USFWS. The relevance of this potential noise effect on the bird species is discussed in Section 4.9, Biological Resources.

Construction-related truck traffic would travel on the access road and bridge over the San Luis Rey River. The L_{eq} noise level based on 100 haul truck trips per day is estimated to be approximately 54 dBA for a one-hour L_{eq} at 100 feet and 55 dBA when combined with the existing ambient noise level of 47.7 dBA.[6] This level would be below the 60 dBA L_{eq} criterion specified by the USFWS. Rock crushing operations would increase noise levels to approximately 58 dBA at the bridge, but the construction noise at this location would remain below the USFWS 60 dBA criteria.

4.6.3.2 Long-Term (Operational) Traffic Noise Impacts

Operation of the proposed landfill would generate additional traffic on public roadways serving the landfill, and could, therefore, increase noise levels along these roadways. For the purpose of this impact analysis, the "worst case" traffic estimates were used to analyze the future traffic-related noise levels associated with the project. During the project's heaviest activity periods the landfill operation, and the transport of leachate, brine, and aggregate off-site[7] would generate approximately 1,410 total daily vehicle trips, of which 96 percent (1,350) would be eight-ton waste collection or construction trucks (Darnell & Associates Inc., 1999). The traffic distribution onto the roadway system indicates that 95 percent of project traffic would be oriented to the west and 5 percent oriented to the east.

The analysis also includes future noise levels along SR 76 that will occur with projected buildout in the area (year 2020). Table 4.6-5 shows the estimated change in roadway noise levels generated by project-generated traffic alone, and by the proposed project in combination with future developments that would contribute traffic to the same roadway cumulative traffic.

Column 2 of the table shows that project-generated traffic would result in estimated CNEL noise level increases over existing noise levels ranging from 0.2 to 4.2 dBA. In community noise assessments, noise level increases greater than 3 dBA are often considered significant, while changes less than 1dBA are not discernable to local receptors. While in laboratory testing situations humans are able to detect noise level changes of slightly less than 1 dBA, in a community situation this is not necessarily true because noise exposure is over a long period of time and changes in noise levels occur over years. Because community noise environments are not immediate comparisons of noise levels, often times a 3 dBA noise increase is considered as a significance threshold for human perception of noise increase. Since the SR 76 corridor is an existing degraded noise environment with noise levels exceeding 60 CNEL at existing residences and the project would increases the noise levels, the project would have a significant noise impact to the existing residences.

A comparison of the estimated 60 CNEL contours under the existing and existing plus project conditions shows that the proposed project would not increase the number of residences that would be exposed to exterior noise levels in excess of 60 CNEL. The residences that are already located within the 60 CNEL contour would continue to be exposed to adverse noise impacts under existing, existing plus project, and cumulative traffic conditions. A cluster of residences on the north side of SR 76 between I-15 and Rice Canyon Road on the Pankey property (see Exhibit 4.6-5) are currently impacted by traffic noise and would be impacted by noise from

[6] Estimated noise levels were calculated using the FHWA traffic noise prediction model and a linear source noise drop-off rate of 4.5 dBA per doubling of distance for a soft site (i.e., loose soil, lawn, field grass). This estimate is based on a 10-hour workday with an even vehicle distribution throughout the day, and a vehicle speed of 15 mph.

[7] A Major Use Permit is required for the exportation or sale of aggregate material and will be obtained if necessary. However, the noise analysis assumes the exportation of rock since this represents a worst-case scenario.

project-generated traffic. The proposed Palomar Aggregates Quarry, located west of the project site, would relocate SR 76 further from the cluster of residences and potentially reduce traffic noise levels at this location. However, because of the uncertainty of the timing of the implementation of the realignment of SR 76 in association with the Palomar Aggregates Quarry project, the noise analysis for the proposed landfill assumes SR 76 remains in its current location.

TABLE 4.6-5
ESTIMATED TRAFFIC NOISE LEVEL INCREASES ON PUBLIC ROADWAYS

HIGHWAY/ROAD SEGMENT	INCREMENTAL NOISE INCREASE DUE SOLELY TO THE LANDFILL (CNEL, dBA)	INCREMENTAL NOISE INCREASE DUE TO THE LANDFILL AND CUMULATIVE DEVELOPMENT[a] (CNEL, dBA)
SR 76		
West of Highway 395	0.3	2.8
East of Highway 395	0.2	2.0
West of I-15	1.2	2.8
I-15 to Pankey Road	4.0	7.3
Pankey Road to Rice Canyon Road.	4.0	6.7
Rice Canyon Rd. to Couser Canyon Rd.	4.2	6.7
Couser Canyon Road to access road	4.2	5.4
East of access Road	0.3	3.2
West of Pala Temecula Road	0.2	4.2
East of Pala Temecula Road	0.2	3.9
Interstate 15		
North of SR 76	0.1	1.9
SR 76 to Pankey Road	0.3	2.0
Old Highway 395		
North of SR 76	0.2	4.6
South of SR 76	0.2	8.3

[a] Noise calculations based on cumulative traffic data from Darnell & Associates, 1999.
To simplify, only roadways that would be affected by the proposed project are shown
Source: Mestre Greve, January 1999, and PCR Services Corporation, June 2002

Potential mitigation for the landfill traffic noise impacts to these existing residences would be the installation of a barrier (e.g., fence, masonry wall, earth berm, or vegetation) along SR 76 to reduce noise levels caused by project-generated traffic. Given the orientation of the residences and proximity to SR 76, a five-foot masonry wall (assuming installation in the right-of-way) would be the most effective sound barrier to mitigate the project's increase in noise levels at the cluster of residences. A total of approximately 730 linear feet of sound wall would be required, with a break in the wall to maintain the common driveway for the cluster of residences. The installation of this sound wall would mitigate project-generated traffic noise to the impacted residences to a level of insignificance. However, since the applicant does not own the property and the property owner objects to a sound wall, implementation of the mitigation measure is not considered feasible.[8] Therefore, because the project traffic would increase the noise levels in an already degraded environment, the project would have a significant noise impact on the cluster of residences.

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8 Personal communication between the applicant and William Pankey, June 2000.

Column 3 of Table 4.6-5 shows the incremental changes in future roadway noise compared to existing noise levels that are attributable to project-related traffic in combination with traffic from cumulative development. Table 4.6-6 presents the cumulative future noise levels (with the

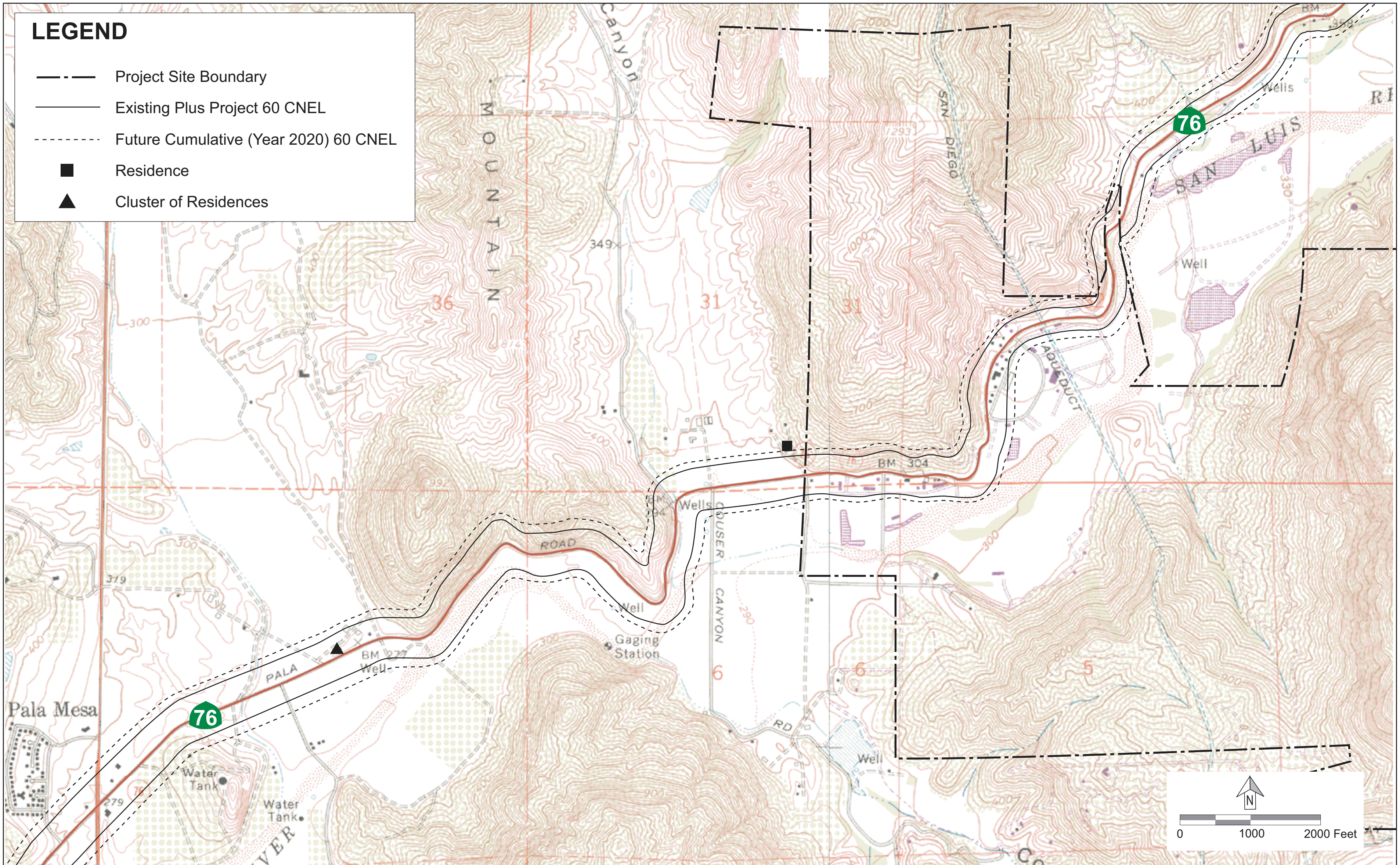
TABLE 4.6-6
ESTIMATED FUTURE CUMULATIVE TRAFFIC-RELATED NOISE LEVELS WITH THE PROPOSED PROJECT

Highway/Road Segment	Estimated Future Cumulative Noise Levels @ 100 ft from Roadway (CNEL, dBA)	Estimated Distance to CNEL Contour from Centerline of Roadway (feet)[a] 70 CNEL	65 CNEL	60 CNEL
SR 76				
West of Highway 395	71.0	117	232	426
East of Highway 395	72.2	137	267	481
West of I-15	72.2	137	267	481
East of I-15	71.6	26	250	455
Pankey Road to Rice Canyon Road	71.0	116	231	423
Rice Canyon Road to Couser Canyon Road	70.8	113	226	416
Couser Canyon Road to Access Road	69.5	93	189	356
East of Access Road	67.3	67	139	271
West of Pala Temecula Road	68.2	75	163	350
East of Pala Temecula Road	67.9	72	155	334
Interstate 15				
North of SR 76	77.6	323	696	1,499
South of SR 76	78.2	351	756	1,628
Highway 395				
North of SR 76	72.4	143	309	666
South of SR 76	72.4	143	309	666
Landfill Access Road				
South of SR 76	65.8	52	112	242
Rice Canyon Road				
North of SR 76	58.3	RW	RW	77
Couser Canyon Road				
South of SR 76	53.5	RW	RW	RW
Pala Temecula Road				
North of SR 76	56.5	RW	RW	59

RW = Noise contour falls inside the roadway right-of-way.
[a] The estimated noise contours do not take into account the effect of any existing noise barriers or topography that may affect ambient noise levels.
Source: Mestre Greve, January 1999 and PCR Services Corporation, May 2002

proposed project) at 100 feet from the centerline of each of the roadways, as well as estimated distances to the 60, 65, and 70 CNEL contours. Exhibit 4.6-5 illustrates the approximate location of the 60 CNEL contour for the cumulative project condition. The projections do not take into account any barriers or topography that may reduce noise levels.

Column 2 of Table 4.6-6 shows that future cumulative noise levels along SR 76, I-15, and Old Highway 395 would be in excess of 70 CNEL. Areas along SR 76 and adjacent to Rice Canyon Road and Pala Temecula Road would be exposed to noise levels in excess of 65 CNEL; and areas along SR 76 and Couser Canyon Road would continue to be exposed to noise levels in excess of 60 CNEL.



NOTE: 1) Noise contours are based on an attenuation rate of 4.5 dB per doubling of distance. Additional noise attenuation from buildings, foliage, and local topography are not included.

2) The existing residences on the project site are not shown since they would be removed as part of project implementation.

Source: USGS Quadrangle & PCR Services Corporation, June 2002

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Exhibit 4.6-5
Existing Plus Project and Future Cumulative (Year 2020) 60 CNEL

Although the majority of the noise on most of the roads would come from other traffic sources, the proposed project would contribute to the cumulative noise levels along all the roadways that serve the project. The estimated 60 CNEL contour between I-15 and the proposed access road ranges from 447 to 622 feet from the centerline (Exhibit 4.6-5). There is the cluster of existing residences (discussed above) and an additional residence on the north side of SR 76 just west of the project site that would be located within the future cumulative 60 CNEL of SR 76 at 2020 Buildout, between I-15 and the western property boundary. These residences would be adversely impacted by cumulative traffic noise. Future noise levels are likely to increase slowly over the years rather than immediately. This problem is a regional problem due to existing, approved, and future development throughout the region, and would occur with or without the project.

The peak hour L_{eq} noise levels are provided in Table 4.6-7 to assess indirect impacts to biological resources from project generated traffic. The peak hour L_{eq} is currently as high as 64.4 dBA at a distance of approximately 100 feet from the centerline of the roadway. Areas closer to the roadway would be exposed to peak hour traffic noise levels greater than 70 dBA. Distances from the roadway centerline to the 70, 65, and 60 dBA contours are also listed in this table.

The existing plus project generated peak hour L_{eq} is also provided in Table 4.6-7. In the existing plus project scenario, the peak hour L_{eq} would be as high as 68.4 dBA at a distance of 100 feet on either side of the roadway centerline. The project would increase the traffic noise levels by as much as 4.0 dBA. The impacts from traffic noise to the biological resources and recommended mitigation measures are provided in Section 4.9, Biological Resources.

4.6.3.3 Long-Term Landfill (Operational) Noise Impacts

Operational noise impacts are divided into the following noise sources; facilities area, borrow/stockpile area operation, landfill working face, and rock crushing/tire shredding.

Facilities Area

The entrance facilities area would have truck scales and a 7,000 square-foot maintenance building. Other facilities would include a recycling drop-off area, parking lot, administrative office, and a flare station. A street sweeper would be used to control fugitive dust emissions and would result in a noise level of 61.0 dBA at 200 feet. Landfill-related traffic, mainly haul trucks entering and exiting the landfill, would be the main noise source in the facilities area. Noise calculations show that the peak hour L_{eq} noise level generated by trucks traveling through the facilities area would be approximately 63.6 dBA at 100 feet.[9] The flare station, which would burn methane collected in the gas system, is a potential noise source and would operate 24 hours a day. The proposed flare station would be located a minimum distance of 4,600 feet from the closest property line adjacent to nearby off-site residences and approximately 400 feet from sensitive wildlife habitat locations (see Exhibit 3-8 for the location of the flare station). The flare station will be designed so that the associated noise levels do not exceed 49 dBA L_{eq} at 400 feet. Noise levels generated by the flare station would be minor when compared to other project-generated noise sources within the landfill site and would not exceed the standard of 62.5 dBA at

[9] Estimated noise levels were calculated using the FHWA traffic noise prediction model and a linear source noise drop-off rate of 4.5 dBA per doubling of distance for a soft site (i.e., loose soil, lawn, field grass). This estimate is based on the peak hour of project-generated traffic of 162 heavy-duty trucks and 4 service vehicles and a vehicle speed of 15 mph.

TABLE 4.6-7
PEAK HOUR L_{EQ} AND TRAFFIC NOISE CONTOUR DISTANCES
EXISTING AND YEAR 2020 WITH AND WITHOUT THE PROJECT

ROADWAY	SEGMENT	PEAK HOUR L_{EQ} @ 100 FEET, dBA	APPROXIMATE DISTANCE TO PEAK HOUR L_{EQ} CONTOUR FROM CENTERLINE OF ROADWAY (FEET)		
			70 dBA	65 dBA	60 dBA
FUTURE YEAR 2020 WITH PROJECT					
SR 76 [a]	I-15 to Pankey Rd	71.7	128	251	456
	Pankey Rd to Rice Cyn Rd	71.1	117	232	424
	Rice Cyn Rd to Couser Cyn Rd	70.9	114	227	417
	Couser Cyn Rd to Access Rd	69.6	94	190	357
	East of Access Rd	67.4	68	140	272
FUTURE YEAR 2020 WITHOUT PROJECT					
SR 76 [a]	I-15 to Pankey Rd	70.3	104	208	387
	Pankey Rd to Rice Cyn Rd	69.4	91	195	347
	Rice Cyn Rd to Couser Cyn Rd	69.1	88	178	337
	Couser Cyn Rd to Access Rd	66.9	63	131	256
	East of Access Rd	67.2	66	136	266
EXISTING PLUS PROJECT					
SR 76 [a]	I-15 to Pankey Rd	68.4	80	162	311
	Pankey Rd to Rice Cyn Rd	68.4	80	162	311
	Rice Cyn Rd to Couser Cyn Rd	68.4	79	162	310
	Couser Cyn Rd to Access Rd	68.4	79	162	308
	East of Access Rd	64.5	44	93	188
EXISTING					
SR 76 [a]	I-15 to Pankey Rd	64.4	43	91	184
	Pankey Rd to Rice Cyn Rd	64.4	43	91	184
	Rice Cyn Rd to Couser Cyn Rd	64.2	42	90	181
	Couser Cyn Rd to Access Rd	64.2	42	89	180
	East of Access Rd	64.2	42	88	180

[a] Assumptions used in predicted traffic noise levels are provided in the Noise Assessment Supplemental Report.
RW=Right-of-way
Source: PCR Services Corporation, May 2002

the nearest residential property line or 60 dBA at the sensitive wildlife habitat locations. This noise verification cannot be conducted until the design of the flare station is completed. The flare station is not installed until landfill gas is generated at levels that warrant the installation of the system. A noise verification specifically for this component of the facilities area will be conducted as part of the design process to ensure compliance with County and USFWS established noise limits and standards. The project may include a sound wall at the base of the flare station and/or silencers on the equipment, as necessary. Any necessary adjustments will be made to the system to ensure compliance with the noise standards.

Recycling Drop-Off Noise

The proposed project includes a recycling drop-off facility for source separated materials. No sorting, or cleaning would be done to the materials at the project site. In 1995 Mestre Greve Associates monitored noise levels at the Sunset Environmental Material Recovery Facility. A (L_{eq}) noise level of approximately 65 dBA was measured at a distance of 30 feet. As a worst case scenario, this noise level is used as a base noise level to project the potential noise levels at the proposed recycling drop-off center. The actual noise level due to the recycling drop-off center would be less. In comparison to other landfill activities, the recycling drop-off area is expected to be relatively quiet. No significant noise impact on the surrounding residents from the recycling drop-off center is expected. The nearest least Bell's vireo habitat is located on the San Luis Rey River. The nearest distance from the proposed recycling drop-off center to the closest bird habitat is estimated to be 700 feet. At this distance, the noise from the recycling drop-off center is calculated to be approximately 42 dBA L_{eq}. The landfill equipment such as dozers, graders, scrapers and compactors would be the dominant noise sources. Therefore, no significant noise impact on the least Bell's vireo from the recycling drop-off center is expected.

<u>Borrow/Stockpile Area Operation</u>

Two borrow/stockpile sites are proposed, one near the western boundary and the other near the southern boundary. Noise measurements made at a similar borrow site operation (Coyote Canyon Sanitary Landfill, Orange County, California) found that an operation with three scrapers had a noise level of approximately 71 dBA at 200 feet.

According to Herzog, the borrow/stockpile areas would require only one loader, as well as other trucks. Based on this assumption, the noise level measurement noted above was adjusted to 68 dBA at 200 feet. It is assumed that a "worst case" condition would be when the loader is operating at the designated edge of the borrow/stockpile areas. In this location, the nearest residential property line would be located 100 to 4,100 feet from the borrow/stockpile areas. It is estimated that the noise levels generated at the borrow/stockpile activities would range from 39 to 61 dBA at the locations closest to the project site with the implementation of the project design feature (Table 4.6-8). As shown in Table 4.6-8, noise from the borrow/stockpile areas would range from 38.5 dBA at site 5 to 61.0 dBA at site 1. Noise from the borrow/stockpile areas, therefore, would not create significant noise impacts.

<u>Landfill Working Face</u>

At most, six pieces of equipment which could include two dozers, two compactors, and two scrapers may be in operation at the landfill working face at any one time. The proposed landfill would have two separate working faces, one for commercial vehicles and one for smaller private vehicles, approximately 50 feet apart.

Extrapolated measurements from the Lancaster Landfill noise study (Mestre Greve Associates, 1994) identified that noise levels for the six pieces of equipment are estimated to be 75 dBA L_{eq} at 200 feet. Therefore, the 75-dBA noise level was used as a base noise level to interpolate the potential noise levels at the landfill working faces.

At its initial phase, the landfill would be depressed below the surrounding terrain. However, as the landfill reaches its vertical capacity, the final elevation would be higher than some of the surrounding areas and the natural shielding effect would be diminished or eliminated. Therefore, the noise levels projected at the top elevations would be considered "worst case." The project design will include five-foot high berms along the southern edges of the landfill working face and Borrow/Stockpile Area B to block the line of sight to the nearest residences and property line south of the landfill.

TABLE 4.6-8
LANDFILL OPERATION NOISE LEVELS AT PROPERTY LINE [a]
INDIVIDUAL AND COMBINED NOISE LEVELS

LOCATION NO./OPERATION [a]	APPROXIMATE DISTANCE BETWEEN LOCATION & OPERATION (FEET)	NOISE LEVELS L_{EQ} (dBA)
Location 1 (Ambient 58.1)		
Truck Traffic	3,930	33.6
Landfill Working Face	3,930	45.1
Borrow/Stockpile Areas	100	59.0
Rock Crushing or Tire Shredding	1,500	54.2
Flare	4,800	39.0
Location 1 Total From Project	--	60.4
Location 1 Total With Ambient		62.4
Location 2 (Ambient 38.9)		
Truck Traffic	1,850	42.2
Landfill Working Face	1,850	53.7
Borrow/Stockpile Areas	480	60.4
Rock Crushing or Tire Shredding	1,500	54.2
Flare	4,600	39.0
Location 2 Total From Project	--	62.1
Location 2 Total With Ambient		62.1
Location 3 (Ambient 38.5)		
Truck Traffic	520	44.3
Landfill Working Face	520	57.9
Borrow/Stockpile Areas	360	57.9
Rock Crushing or Tire Shredding	1,500	55.9
Flare	4,600	39.0
Location 3 Total from Project	--	62.2
Location 3 Total with Ambient		62.2
Location 4 (Ambient 41.2)		
Truck Traffic	1,400	25.3
Landfill Working Face	1,400	37.5
Borrow/Stockpile Areas	1,750	48.3
Rock Crushing or Tire Shredding	1,500	54.2
Flare	5,800	37.0
Location 4 Total From Project	--	55.3
Location 4 Total With Ambient		55.4
Location 5 (Ambient 43.7)		
Truck Traffic	2,700	29.9
Landfill Working Face	2,700	40.1
Borrow/Stockpile Areas	4,100	38.5
Rock Crushing or Tire Shredding	1,500	54.2
Flare	6,600	36.0
Location 5 Total From Project	--	54.5
Location 5 Total With Ambient		54.8

[a] Noise levels represent nearest residential property lines (Exhibit 4.6-4)
Source: Mestre Greve Associates, January 1999 and PCR Services Corporation, 2002

Under these conditions, it is estimated that the noise levels generated by the landfill working face activities alone would range from approximately 37.5 dBA L_{eq} at Location 4 to 57.9 dBA L_{eq} at Location 3. These noise levels would fall below the 62.5 dBA L_{eq} criteria and would not be considered significant.

Rock Crushing/Tire Shredding Operations

Rock crushing and tire shredding are proposed as part of the landfill project and would occur within the southwestern portion of the landfill footprint, a minimum of 1,500 feet from Locations 1 through 5 (Exhibit 4.6-4) to minimize impacts at the adjacent residential property lines. The analysis provides for transport of excess aggregate off-site for sale.[10]

The rock crushing operation would primarily generate noise due to the trucks hauling the crushed rock from the rock crushing area. A noise analysis for a similar rock crushing operation (Arroyo Trabuco Sand and Gravel Operation) was reviewed to determine the range of noise levels that could be generated by such an operation. The analysis showed that at 500 feet the minimum noise level was 61.8 dBA and the maximum noise level was 75.7 dBA. The average noise level (for 15-minute measurement periods) was 65.4 L_{eq} dBA at 500 feet. Based on these data, noise levels that would be generated by the rock crushing activity were calculated. By itself, the rock crushing activity would generate a L_{eq} noise level of 54.2 at a distance of 1,500 feet. The tire shredder will be brought on-site approximately once every six months or when tire volumes necessitate. The predominant noise sources of a portable tire shredder are the engine operation and the cutting blades. Noise levels from the tire shredder would be comparable to that of the rock crusher. To maintain the 62.5 L_{eq} at the property boundary a mitigation measure is included to ensure that the tire shredding and rock crushing do not occur at the same time.

Total Combined Landfill Noise at the Nearest Residential Property Lines

Because various activities will occur simultaneously at the landfill footprint and the borrow/stockpile areas, evaluation of the combined noise levels with ambient noise is necessary to determine the total noise effect at the five analysis locations (Exhibit 4.6-4). The closest points are estimated to range from 520 to 3,930 feet away from the landfill working face and between 100 and 4,100 feet from the stockpile/borrow areas. The rock crusher and tire shredder are portable and would be located no closer than 1,500 feet from the property line.

Table 4.6-8 summarizes the potential “total landfill” noise levels at the nearest receptors from all of the potential landfill-related noise sources. The total combined landfill noise due to all landfill and rock crushing activities operating simultaneously would be greater than noise due to individual landfill operation. Total landfill and rock crushing operations including ambient noise would result in noise levels ranging between approximately 54.8 dBA to 62.4 dBA. This is within the noise limits of 62.5 dBA L_{eq} established for the property line adjacent to the nearest existing homes. Therefore, based on the San Diego County Noise Ordinance, these noise levels would be less than significant.

[10] A Major Use Permit is required for the exportation or sale of aggregate material and will be obtained if necessary. However, the noise analysis assumes the exportation of rock since this represents a worst-case scenario.

Total Combined Landfill Noise Affecting the Wildlife Habitat

To evaluate the effect of noise generated by long-term landfill operations on nearby wildlife habitat, it was estimated that the closest edges of the proposed landfill operations would be 50 to 3,000 feet from the nearest wildlife habitat. The nearest wildlife habitat was assumed to be located all along the river and in trees typically 15 feet above the river.

The worst case scenario would be when the landfill operations occur at the northernmost edge of the operation-designated area and at a high elevation, where the wildlife habitat would have line-of-sight with the noise source. However, as the landfill operation would move farther away and out of sight of the habitat, the noise levels would be reduced due to intervening topography and distance. The noise analysis assumed the worst-case noise conditions for two representative habitat locations along the river. Location 1 is near the western boundary, closest to the Borrow/Stockpile Area A, and Location 2 is located just northeast of the proposed facilities area (Exhibit 4.6-4).

The noise analysis was first conducted assuming no berms or other attenuating features except for intervening existing topography and distance (atmospheric absorption). The results are shown in the third column of Table 4.6-9. As shown, the combined noise levels of all the landfill operations would be 62.0 dBA (L_{eq}) at Location 1 and 60.9 dBA (L_{eq}) at Location 2. Thus, they would exceed the 60 dBA (L_{eq}) criterion at both habitat locations. A second run including berms to reduce noise levels was conducted for both locations. The second run for Location 2 assumed construction of the 18- to 20-foot berm that is proposed as part of the project. This berm would be placed along the northern edge of the landfill footprint (between the facilities area and the landfill footprint). In addition, a 10- to 16-foot high sound wall will be included along the northern edge of the facilities area and the truck route east of the facilities area. As shown in the fourth column of Table 4.6-9, the berm and sound wall would reduce landfill operation noise at Location 2 to below the significance threshold of 60 dBA (L_{eq}). If during noise monitoring, the landfill noise levels do not exceed 60 dBA, then the sound wall could be removed.

For Location 1, a second run was conducted assuming that a 12-foot berm would be placed along the northern edge of the Borrow/Stockpile Area A (extending continuously south from the northwestern corner of the borrow/stockpile area). It is estimated that Borrow/Stockpile Area A, after use during initial construction, will not be used until about operational year 25. As shown in the fourth column of Table 4.6-9, with this berm, the noise levels at Location 1 would be reduced to below 60 dBA L_{eq}.

The 1,410 daily project generated trips (1,350 daily truck trips for waste trucks, materials, rock exportation,[11] and brine and leachate removal and 60 trips from employee and service vehicles) at a distance of 50 feet from the center of the roadway (to the nearest least bell's vireo habitat), would result in a peak hourly L_{eq} of 68.3 dBA. [12] This exceeds the significance threshold of 60 dBA L_{eq}.

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[11] A Major Use Permit is required for the exportation or sale of aggregate material and will be obtained if necessary. However, the noise analysis assumes the exportation of rock since this represents a worst-case scenario.

[12] Estimated noise levels were calculated using the FHWA traffic noise prediction model and a linear source noise drop-off rate of 4.5 dBA per doubling of distance for a soft site (i.e., loose soil, lawn, field grass). This estimate is based on the peak hour of project-generated traffic of 162 heavy-duty trucks and 4 service vehicles and a vehicle speed of 15 mph.

TABLE 4.6-9
POTENTIAL NOISE LEVELS AT THE CLOSEST LEAST BELL'S VIREO HABITAT

OPERATION	DISTANCE (FT)	NOISE LEVELS WITHOUT BERMS (dBA L_{EQ})	NOISE LEVELS WITH BERMS (dBA L_{EQ})
LBV-1[a] (Ambient 53.9)			
Landfill Working Face	3,000	48.3	34.9
Borrow/Stockpile Sites	520	60.0	51.8[c]
Entry Facilities Area/Truck Traffic	2,400	39.9	39.9
Rock Crushing or Tire Shredding	1,500	54.2	54.2
Flare	3,200	42.0	42.0
Total Project Noise Levels	--	61.3	56.5
Total With Ambient		62.1[b]	58.4
LBV-2[a] (Ambient 47.7)			
Landfill Working Face	400	53.6	43.8[d]
Borrow/Stockpile Sites	2,800	43.1	43.1
Entry Facilities Area	180	59.2	54.2[e]
Rock Crushing or Tire Shredding	1,500	54.2	54.2
Flare	400	49.0	49.0
Total Project Noise Levels	--	61.5	58.1
Total With Ambient		61.7[b]	58.5

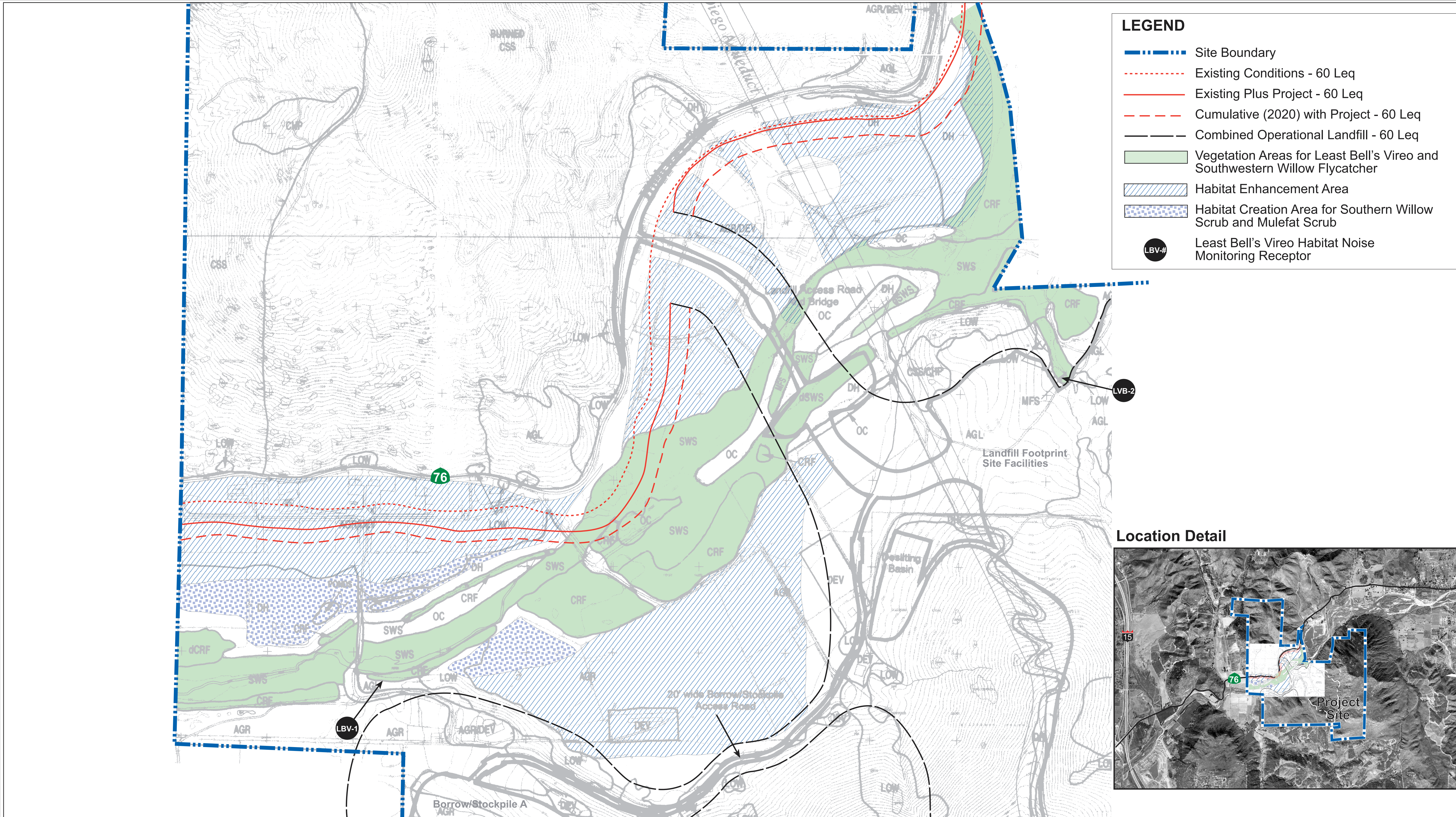
[a] Locations are shown on Exhibit 4.6-4.
[b] Exceeds 60 L_{eq} dBA criterion.
[c] This noise reduction is attributable to a 12-foot berm that is identified as a mitigation measure in Section 4.9.4.
[d] This noise reduction is attributable to the 18- to 20-foot berm that is to be constructed at the northern end of the landfill footprint as a project design feature.
[e] This reduction is attributable to a 10- to 16-foot high sound wall along the northern edge of the facilities area and the truck route east of the facilities area.
Source: Mestre Greve Associates, January 1999, PCR Services Corporation, May 2002

Exhibit 4.6-6 illustrates the approximate location of the 60 L_{eq} contour for the total combined landfill noise affecting the wildlife habitat. The analysis of noise impacts on least bell's vireo and recommended mitigation measures to reduce these noise impacts to a level of insignificance are provided in Section 4.9, Biological Resources.

Estimated Total Combined Landfill CNEL Noise Levels

Proposition C requirements are in terms of the 24-hour average CNEL noise scale. However, the proposed landfill would not be in continuous operation for 24 hours. Hours of operation would be generally between 7:00 A.M. and 6:00 P.M. Therefore, in terms of the CNEL noise scale, the estimated CNEL noise levels would be less than the corresponding L_{eq} noise levels. CNEL levels from the project would be about 3.4 dBA less than the corresponding L_{eq} levels. As a result, the potential landfill CNEL noise levels at the property line would be below the 65 CNEL Proposition C noise limit.

The applicant intends to meet the stricter County Noise Ordinance standard. Compliance with the County Noise Ordinance standard, in terms of the L_{eq} scale, would ensure a more acceptable noise environment at the nearest residential areas, and the landfill noise levels would not be considered to be discernible at these nearest homes.



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0 400 Feet

Source: HELIX Environmental Planning, inc., July 2000

PCR

Exhibit 4.6-6
Total Combined Landfill
Noise Affecting Wildlife Habitat

ADMINISTRATIVE DRAFT - NOT FOR PUBLIC REVIEW-Work-in-Progress

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4.6.3.4 Blasting Vibration Impacts

At its closest point, the proposed landfill footprint would be immediately adjacent to the easement for the First San Diego Aqueduct (Exhibit 3-3). Provision of a continuous and safe water supply through the First Aqueduct is of prime importance throughout the lifespan of the proposed landfill activities. Vibrations from the blasting used to excavate the landfill bottom surface could potentially affect the integrity of the aqueduct, including stability and structural soundness.

Similar to an earthquake, a blast generates two types of energy waves in the ground: irrotational waves (sometimes called dilational waves) and equivoluminal waves (sometimes called shear or distortional waves). Irrotational waves arrive first and are designated in the geologic nomenclature with the symbol “P” (for primus or primary), while the equivoluminal waves, which arrive second, are designated as “S” (for secundus or secondary). P waves are orthogonal (perpendicular) to the advancing wavefront while S waves are parallel to the wavefront. Of the two types of waves generated during a blast, only the S waves are of principal concern since they are more likely to cause damage. The P waves, although traveling farther, dissipate (or decay) rapidly as distance increases from source to receiver. The vibration technical report analysis predicts the decay distance of transverse waves resulting from construction blasting along the First Aqueduct.

<u>Construction Blasting Zone of Influence</u>

The construction blasting zones of influence are based upon assumed peak vibration levels produced by similar operations and the amount of damping present at the proposed Gregory Canyon Landfill site. The assumed peak vibration level was taken as an instantaneous 15.0 inch per second impulse at a reference distance of 50 feet. Nominal attenuation distance is calculated as the distance where the vibration levels drop below a level of significance. The level of significance is defined according to the Bureau of Mines RI 8507 frequency dependent standard.

The graphical results of the blasting modeling are shown in Appendix D of the vibration technical report. Table 4.6-10 shows the minimum blast distance from the aqueduct that is necessary to meet the Bureau of Mines RI 8507 standards. The last column of Table 4.6-10 incorporates a 1.5 factor of safety to account for experimental and construction blasting errors.

For the purposes of impact determination, the 0.25 second blast decay rate (from Appendix D of the vibration technical report) was used as the response curve of choice to represent a worst case analysis.

Based upon the level of damping determined for the aqueduct-soil system, the response curves (with an incorporated safety margin) indicate a minimum safe blasting distance of 165 feet for a pure 15.0 Hz wave at this magnitude. As indicated previously, the frequency content of the blast was determined by two small test charge detonations at the landfill site. These distances form the zone of influence due to blasting interaction along the aqueduct alignment. The recommended open-face charge weight per delay to satisfy the above model was calculated to be 34 pounds per 8 millisecond (minimum) delay.

Given the definition of the zone of influence, impacts are expected if blasting occurs inside the influence zone for the respective frequency and maximum velocities. No impacts are expected outside this zone. As can be seen from Table 4.6-10, low frequency waves (below 10 Hz) have the lowest allowable ground velocity threshold, and by their very nature damp out more slowly and convey more energy with the potential to cause structural damage. Thus, a minimum recommended blast distance of greater than 750 feet would be required to mitigate a 15.0 inch per second, pure 5 Hz impulse recorded at 50 feet. This distance drops to slightly over 130 feet for a pure 40 Hz wave. SDCWA has requested that no blasting occur within 500 feet of existing pipelines. This distance will be maintained and is included in the project design features.

TABLE 4.6-10
RECOMMENDED MINIMUM ALLOWABLE BLASTING LIMITS FROM SDCWA AQUEDUCT

PRIMARY BLAST FREQUENCY CONTENT	BUREAU OF MINES RI 8507 MAXIMUM ALLOWABLE	MINIMUM BLAST DISTANCE FROM AQUEDUCT FOR COMPLIANCE	RECOMMENDED MINIMUM BLASTING DISTANCE FROM AQUEDUCT (MS=1.5)
5 Hz	0.05 in/sec	>500 feet	>750 feet
10 Hz	0.05 in/sec	263 feet	395 feet
15 Hz	0.75 in/sec	110 feet	165 feet
20 Hz	1.0 in/sec	94 feet	141 feet
30 Hz	1.5 in/sec	91 feet	137 feet
40 Hz	2.0 in/sec	88 feet	132 feet

Hz = Hertz
MS = margin of safety
in/sec = inches per second
Minimum blast distance are based upon a maximum recordable instantaneous ground disturbance of 15.0 in/sec PPV measured at a reference distance of 50.0 feet from the detonation point.
A frequency independent small-strain material damping ratio of 0.0021 per foot was used and is based upon empirical measurements. This level accounts for local aqueduct-soil interaction.
Decay curves are based upon a 0.25 second wave decay rate.
Values given are for open-face blasting only. Charges fired with a high degree of confinement, such as in pre-split blasting, generate peak particle velocity levels up to 10 times greater than those predicted. Blasting done for opening holes should use significantly larger blast distances or correspondingly smaller charges.
Source: Ogden Environmental and Energy Services, 1996

From the experimental test blasts, the principal frequency response of the soil occurred at approximately 15 Hz. For a groundborne vibrational wave with a 15 Hz primary component, the distance traveled by the wave will be 165 feet before diminishing to a level of 0.75 inches per second as set by the RI 8507 standard (Table 4.6-10). The vibration technical report calculates the open face maximum amount of explosives per eight millisecond delay as being 34 pounds. Confined blasts should be scaled down by approximately a factor of nine (approximately four pounds of explosive per eight millisecond delay) to reduce excess vibration levels. No impacts are expected provided confined blasting occurs at scaled velocity/charge ratios equal to or greater than the identified value of nine. However, since no data is currently available regarding the locations of blasting or the charge sizes necessary, measures must be implemented to ensure that the potential vibratory effects of blasting are mitigated to a less than significant. The following measures are incorporated into the project:

- Blasting operations will be performed in accordance with criteria adopted in San Diego County Water Authority design procedure manual 02229-3 (February 1995). Blasting will not occur within 500 feet of the existing pipelines 1 and 2 unless approved by SDCWA.
- All drilling and blasting operations shall be conducted by a State-licensed blasting contractor with adequate blasting insurance.

- Seismograph instrumentation will be placed along the aqueduct alignment in the vicinity of any blasting operations.
- All drilling and blasting will be performed during hours designated by local, State, or federal ordinances.

Impacts to Nearby Residences

Using the assumed blasting conditions described previously and a dominant blast frequency of 18 Hz gives a distance of 155 feet before the blast wave drops below the RI 8507 threshold. Applying a margin of safety to this value gives an acceptable blast-receiver separation distance of approximately 230 feet. Since the nearest receptor is over 800 feet away from the closest possible blasting point, no significant ground motion impacts would occur to the nearest residences. In summary, blasting operations of the type described previously would not produce significant impacts to nearby sensitive receptors, nor would applicable threshold criteria be exceeded. As required in Proposition C, written notice will be provided to residents within a one-mile radius of the blast site within 24 hours of the blasting.

Impacts to Existing/Proposed SDG&E Facilities

The existing SDG&E transmission towers located along the eastern edge of the canyon are approximately 100-foot steel truss assemblies secured at four locations atop concrete support piers. The truss structure itself is a pined assembly having very little damping due to its all-steel construction. Small motions imparted to the base of the structures would be dispersed throughout the structure with a resulting translation (i.e., horizontal movement) of the top of the tower. This movement could effectively "pull" on the transmission lines suspended between the towers possibly damaging the ceramic stand-offs. Larger motions could produce the potential for brittle shear of the support columns with a subsequent reduction of load-carrying capability of the member.

As similarly described for the First San Diego aqueduct, the relative damping level between the soil and the support pier is the principal mechanism to remove unwanted ground motion from the tower structure. This damping level description is provided in Appendix J. Damping levels associated with the various test trials are shown in Table 3 of Appendix J. In general, the levels were slightly less than those previously seen for the First San Diego Aqueduct alignment. The results show that an average damping ratio of roughly 3.17 percent was present during testing. This level is consistent with the surface composition (i.e., to the depth of the pier) of this area which is unconsolidated and readily dampens vibratory energy.

Table 4.6-11 shows the minimum linear distance required to meet the Bureau of Mines RI 8507 standards for blasting in the vicinity of the SDG&E transmission towers. The last column of Table 4.6-11 incorporates a 1.5 factor of safety to account for experimental and construction blasting errors. For the purposes of impact determination, the 0.25 second blast decay curve was taken as the response curve of choice. Hence, this analysis represents a worst-case analysis. Based upon these findings, the minimum blast separation distance would be 135 feet. This value rises to 814 feet for a pure 5 Hz source wave. Since the dominant frequency of the test blasts was 18 Hz, an impact distance of roughly 150 feet would be an acceptable exclusionary distance for blasting operations.

In summary, for the predicted 18 Hz dominant blast wave, a source-receiver separation distance of roughly 150 feet is required for both the SDG&E facilities and aqueduct system. This value is based on the fact that both the SDG&E tower support piers and the aqueduct system have approximately the same level of soil-structure damping. For blasting outside the bounds of this prediction, the levels shown previously in Tables 4.6-10 and 4.6-11 and the vibration technical reports (Ogden, 1996; Investigative Science and Engineering, 1998) should be used.

TABLE 4.6-11
RECOMMENDED MINIMUM ALLOWABLE BLASTING LIMITS
FROM SDG&E TRANSMISSION CORRIDOR

PRIMARY BLAST FREQUENCY CONTENT	BUREAU OF MINES RI 8507 MAXIMUM ALLOWABLE	MINIMUM BLAST DISTANCE FROM SDG&E CORRIDOR FOR COMPLIANCE	RECOMMENDED MINIMUM BLASTING DISTANCE FROM SDG&E CORRIDOR (MS=1.5)
5 Hz	0.05 in/sec	543 feet	814 feet
10 Hz	0.05 in/sec	285 feet	427 feet
20 Hz	1.0 in/sec	95 feet	142 feet
30 Hz	1.5 in/sec	92 feet	138 feet
40 Hz	2.0 in/sec	90 feet	135 feet

Hz = Hertz
MS = margin of safety
Minimum blast distance based upon a maximum recordable instantaneous ground disturbance of 15.0 inches/second PPV measured at a reference distance of 50.0 feet from the detonation point
A frequency independent small-strain material damping ratio of 0.0016 per foot was used and is based upon empirical measurements. This level accounts for local pier-soil interaction.
Decay curves based upon a 0.25 second wave decay rate.
Source: Investigative Science and Engineering, 1998

Pre-Blasting Construction Operations

In addition to the direct effects of blasting, preparation for blasting will require drilling and the movement of vehicles along the aqueduct alignment. However, vehicular activity along the aqueduct is expected to produce vibration levels equivalent to those along SR 76. Since these levels are below the applicable threshold criteria, no impacts are expected. Additionally, operation of pneumatic drills and hammers associated with blasting would occur at the blast site which, by definition, is adjacent or outside the zone of influence. Since this type of machinery produces vibration levels far below those set for the influence zone, no significant impacts are expected.

4.6.3.5 Site Closure Impacts

Closure of the landfill would result in the cessation of most noise-producing activities. Noise related to traffic, landfill equipment operations, and blasting would cease upon closure of the landfill. Although the gas flare facilities would continue to produce minor levels of noise, those impacts would be mitigated to a less than significant level prior to the commencement of landfill operations and would remain as such in the long-term.

Since blasting is only required during the operational phase of the landfill, such activities and their vibration impacts would cease following closure of the facility.

4.6.3.6 Relocation of the First San Diego Aqueduct Project Option

Noise and vibration from the Relocation of the First San Diego Aqueduct Option would be similar to those described with the project. The southernmost portion of the relocation of the aqueduct would be located approximately 1,800 feet from the southern property line. Because of the distance between the area of relocation of the pipelines and the nearest off-site receptor, no significant noise impacts would occur.

4.6.4 MITIGATION MEASURES AND PROJECT DESIGN FEATURES

Proposition C

Section 5K of Proposition C contains the following general mitigation measure relative to potential noise impacts:

MM 4.6.C5K *The applicant shall prepare a Noise Abatement Plan to include:*

- *Physical design provisions to ensure that ambient noise levels do not exceed 65 CNEL at the boundaries of the Gregory Canyon site.*
- *Installation of landfill equipment and vehicles with noise suppressing equipment to assist in meeting the above restrictions.*
- *Provisions for at least 24-hour in advance written notice of any blasting on-site to residents within a one-mile radius of the blast site.*
- *Where ambient noise levels exceed 65 CNEL at the boundaries of the Gregory Canyon site, the applicant shall retain a qualified noise expert to evaluate the problem and recommend mitigation measures. These mitigation measures will be implemented by the applicant.*

Project Design Features

Project design features incorporated into the project to reduce noise levels in nearby sensitive wildlife habitat are included in Section 4.9, Biological Resources.

- The project includes the preparation of a blasting plan which will incorporate the following measures:
  - Blasting operations will be performed in accordance with criteria adopted in San Diego County Water Authority design procedure manual 02229-3 (February 1995). Blasting will not occur within 500 feet of the existing pipelines 1 and 2, unless approved by SDCWA.
  - All drilling and blasting operations shall be conducted by a State-licensed blasting contractor with adequate blasting insurance.
  - Seismograph instrumentation will be placed along the aqueduct alignment in the vicinity of any blasting operations.
  - All drilling and blasting will be performed during hours designated by local, State, or federal ordinances.
  - Monitoring of the blasting operations within close proximity to the SDG&E towers will be performed to verify that peak vibration levels and U.S. Bureau of Mines RI 8507 standards are not exceeded.
  - Blasting operations will not occur within 150 feet of the SDG&E towers.
- Rock crushing or tire shredding will be located a minimum of 1,500 feet from Locations 1 through 5 (Exhibit 4.6-4) unless other forms of noise attenuation, such as berms or acoustical curtains, are used to reduce combined landfill noise levels to below 62.5 dBA L_{eq}.

- Written notice to residents within a one-mile radius of the blast site will be provided at least 24 hours in advance of any blasting on-site.
- A 15- to 20-foot high berm will be constructed and maintained along the northern boundary of Borrow/Stockpile Area A from the haul road westward wrapping around the western boundary of Borrow/Stockpile Area A during initial construction and during future operations. The base elevation of the berm would change whenever the elevation of the stockpile increases or decreases; however, the height relative to the stockpile would remain at 15- to 20-feet above the top of the stockpile.
- Five-foot high berms will be constructed along the southern edge of the Borrow/Stockpile Area B and the landfill working face, which face the residential zoned property south of Gregory Canyon Landfill. The berms shall block line of sight from the residential property to the heavy equipment working the southern portions of Borrow/Stockpile Area B and the landfill working face.
- A 10- to 16-feet high sound wall will be constructed along the northern edge of the facilities area and the truck route east of the facilities area.
- The flare station will be designed and located so that the flare does not generate noise levels that will exceed 49 dBA at a distance of 400 feet from the flare. Measures may include a sound wall at the base of the flare as well as any needed silencers on the equipment.

Impacts and Mitigation Measures

In addition to the mitigation measure contained in Proposition C and the project design features, more specific mitigation measures have been developed to reduce potential noise impacts identified in the noise analysis. Potential impacts to least Bell's vireo habitat, which would be exposed to noise levels exceeding 60 dBA L_{eq} during construction of the new access road and bridge and after landfill operations begin, are addressed in Section 4.9, Biological Resources.

Impact 4.6-1: *During construction activities within the landfill footprint, noise levels could exceed the 62.5 dBA L_{eq} noise standard established by the County Noise Ordinance at the property line adjacent to residential uses.*

MM 4.6-1a: The applicant shall monitor noise levels at the property lines adjacent to residential uses in the first year of the initial construction and whenever the construction operation changes. If noise levels exceed 62.5 dBA L_{eq} at the property line, the applicant shall implement some or all of the following measures to reduce the noise levels to below 62.5 dBA L_{eq}:

- Build temporary noise barriers or berms between construction activities and residences. Such barriers or berms shall be disassembled when construction is complete. Sound barriers made of plywood would likely be sufficient, given the topography of the site and adjacent area. Other design parameters (e.g., height, length, and location) for these temporary noise barriers or berms shall be determined by a qualified noise expert.
- Reduce the amount or size of construction equipment. For example, equipment with smaller engines could be used. This would be feasible for most types of equipment. However, the geology of the site may dictate the minimum size of certain types of rock moving or other equipment.

If the 62.5 dBA L_{eq} threshold is not exceeded, no action beyond monitoring shall be necessary.

MM 4.6-1b: All construction activities shall be limited to between the hours of 7:00 A.M. and 6:00 P.M., Monday through Friday and 8:00 A.M. to 5:00 P.M. on Saturday as required under Proposition C. Construction shall not occur on Sundays or federal holidays.

MM 4.6-1c: The applicant shall ensure that construction equipment and trucks are properly tuned and have noise muffling equipment that meets or exceeds applicable EPA standards.

Impact 4.6-2: *Noise levels from rock crushing and tire shredding could exceed 62.5 dBA L_{eq} at the adjacent residences if the operations occur simultaneously.*

MM 4.6-2a: The operator shall ensure that the tire shredding and rock crushing shall not occur at the same time.

MM 4.6-2b: Tire shredding operations shall be monitored the first time such activity is conducted on-site to ensure that noise levels do not exceed the residential and wildlife thresholds. If the noise levels exceed either threshold, the applicant shall implement noise abatement measures which may include such measures as equipment silencers, enclosures, noise baffling, and/or berms. If the thresholds are not exceeded, no additional action beyond monitoring shall be required.

Impact 4.6-3: *Although the flare station is not anticipated to create any significant noise impacts, the flare station could generate noise that would exceed the County Noise Ordinance standard of 62.5 dBA L_{eq} and 60 dBA L_{eq} for sensitive receptors and wildlife habitat, respectively.*

MM 4.6-3: Noise verification shall be conducted specifically for the flare station prior to commencement of its operation to ensure compliance with the 62.5 dBA L_{eq} and 60 dBA L_{eq} at the property line and for wildlife habitat, respectively.

Impact 4.6-4 *The project would contribute to cumulative traffic noise levels at residences along SR 76 that exceed the County noise standard of 60 CNEL.*

MM 4.6-4 Unless determined infeasible by CalTrans, the project applicant shall provide a fair share contribution for the cost to install a sound wall in the right-of-way along SR 76 to reduce noise levels from cumulative traffic at the existing residences.[13]

4.6.5 LEVEL OF SIGNIFICANCE AFTER MITIGATION

The project's design and the mitigation measures identified in Section 4.6.4 would reduce the construction and operational noise and vibration impacts to adjacent sensitive receptors to a level of less than significant, with the exception of noise from project-generated traffic. Existing noise

[13] A sound wall would also reduce the project-related increase in traffic noise levels.

levels at residences located on SR 76 between I-15 and the western property boundary exceed the County's standard of 60 CNEL without the project. The existing noise levels at a cluster of residences located on the north side of SR 76 between I-15 and Rice Canyon Road currently exceed 60 CNEL. Project-generated traffic would increase noise levels by 0.1 to 4.2 dBA. While sound walls could reduce the project's contribution of noise levels to a level of insignificance, because the sound wall would need to be installed on property that is not owned by the applicant and the property owner objects to the installation of a sound wall, the mitigation measure is considered infeasible. Therefore, because the site is within a corridor that has noise levels that exceed the County standard and the project would contribute to a degraded noise environment and mitigation measures are not assured, the project would result in a significant and unmitigable noise impact from traffic.

In addition, cumulative noise impacts would occur, with or without the project implementation, because the cluster of homes discussed above and an additional residence just west of the project site would be within the year 2020 60 CNEL noise contour. While sound walls could reduce the project's cumulative contribution at these locations to a level of insignificance, because the applicant does not own the property and it is not known if residents may object to a sound wall, the mitigation is considered infeasible. However, a mitigation measure has been provided that the applicant contribute a fair share contribution for the construction of a sound wall if CalTrans determines that such a wall is feasible to install in the right-of-way with the future widening of SR 76. While this measure could be considered fair share contribution under CEQA Guidelines 15130(a)(3), given the uncertainty of its implementation, this section concludes that the project would contribute to a cumulative traffic noise impact to these residences on SR 76. See Section 5.2.6 for a discussion of cumulative impacts associated with noise.